PREDATOR ACQUISITION PROGRAM TRANSITION FROM RAPID TO STANDARD PROCESSES

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by

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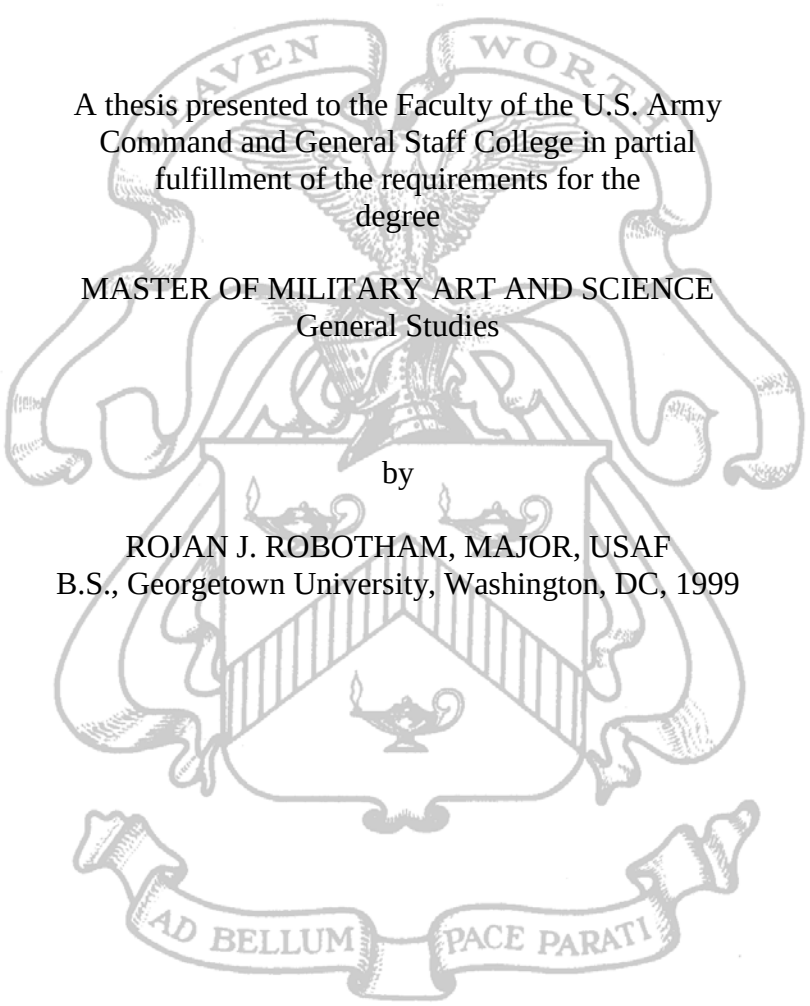

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In 1998, Predator became the first Advanced Concept Technology Demonstration to transition into the Defense Acquisition System. When it did, it operated within the Air Force's rapid acquisition office. Predator operated here until it made its final transition into its own program office. In 2006, Predator transitioned into the 658th Aeronautical Systems Squadron and began incorporating more standard acquisition processes. This thesis examines the successes and challenges of converting a rapid acquisition program with years of operational experience into the standard model.

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The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

ABSTRACT

PREDATOR ACQUISITION PROGRAM TRANSITION FROM RAPID TO STANDARD PROCESSES, by Maj Rojan J. Robotham, 100 pages.

In 1998, Predator became the first Advanced Concept Technology Demonstration to transition into the Defense Acquisition System. When it did, it operated within the Air Force's rapid acquisition office. Predator operated here until it made its final transition into its own program office. In 2006, Predator transitioned into the 658th Aeronautical Systems Squadron and began incorporating more standard acquisition processes. This thesis examines the successes and challenges of converting a rapid acquisition program with years of operational experience into the standard model.

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I would like to thank the men and women who contribute to the acquisition of Predator and Reaper systems. Specifically, I admire the team that supported the Predator program from 2006 through 2010. Your contributions to Operation Iraqi Freedom and Operation Enduring Freedom will never be in the news, but without you, Predators would not be available. Predator continues to lead the way!

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ACRONYMS

ACTD	Advanced Concept Technology Demonstration
AF	Air Force
DAB	Defense Acquisition Board
DARO	Defense Airborne Reconnaissance Office
DAS	Defense Acquisiton System
DoD	Department of Defense
DOTMLPF	Doctrine, Organization, Materiel, Leadership, Personnel, Facilities
GA-ASI	General Atomics Aeronautical Systems Incorporated
GCS	Ground Control Station
GWOT	Global War on Terrorism
ISR	Intelligence, Surveillance, and Reconnaissance
JCIDS	Joint Capability Integration and Development System
JROC	Joint Requirements Oversight Committee
LRIP	Low Rate Initial Production
MDA	Milestone Decision Authority
MNS	Mission Needs Statement
MS	Milestone
OCO	Overseas Contingency Operation
OEF	Operation Enduring Freedom
OIF	Operation Iraqi Freedom
OIPT	Overarching Integrated Product Team
ORD	Operational Requirements Document
OSD	Office of Secretary of Defense

PPBE	Planning, Programming, Budgeting, Execution
RGS	Requirements Generation System
ROVER	Remotely Operated Video Enhanced Receiver
UAS	Unmanned Aerial System
US	United States

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CHAPTER 1

BACKGROUND

Introduction

The ten years of war in Iraq and Afghanistan have resulted in numerous changes in how the United States military fights. The majority of fighting centered on counterinsurgency operations versus conventional operations. The Department of Defense (DoD) was not initially equipped to meet this challenge. Counterinsurgency operations required different materiel solutions than the United States had envisioned at the start of military operations. A rapid acquisition process was necessary to respond to these needs faster than the standard procurement timeline. At the start of the war, there was no consistent rapid acquisition strategy approach in place to meet the emerging warfighter needs. As a result, the acquisition process improvised the implementation of several new programs some of which were not always consistent with standard acquisition requirements. These programs achieved success via rapid acquisition and as a byproduct created diverse procedures and cultures. This diversity is not consistent with standard acquisition processes and not sustainable over the long term. As the military objectives in Operation Enduring Freedom (OEF) and Operation New Dawn (OND), the follow-on phase to Operation Iraqi Freedom (OIF), continue to drawdown, improvised program processes increasingly confront the challenge of transitioning to standard acquisition requirements. Some of these programs will transition to standard acquisition programs while other programs will end. For the programs that transition to standard acquisition processes, there is much to learn from examining the issues germane to the Predator (MQ-1) program's transition from rapid acquisition to standard acquisition.

Research Objective

The Predator unmanned aerial system (UAS) is an example of a program that successfully delivered operational capability while transitioning into standard acquisition processes. Predator is the first program to use the Advanced Concept Technology Demonstration (ACTD) process to transition into the defense acquisition system. The Predator program then transitioned along the spectrum from rapid to standard acquisition processes throughout its production time. The transition was not complete, as some processes currently used in the program office still contain remnants of its ACTD origins. Thus, the program's unique experiences serves as an initial start point for examining issues relevant to overcoming modified procedures that inhibit the smooth transition from rapid to standard processes. The goal is to provide lessons learned for future decision makers and program managers about transitioning programs from rapid to standard acquisition processes.

Research Questions

1. What problems and successes occurred as Predator transitioned from a rapid acquisition program into a traditional program?

2. Was Predator's transition successful?

3. What lessons learned can benefit current and future programs?

Study Limitations

This case study examines the Predator program from 1996 through 2010. The study begins when the program transitioned from ACTD into Air Force (AF) management. Specifically, the study focuses on the timeframe spanning 2006 through

2010. The Predator program transferred during this time from the Big Safari program office into its own unique program office, 658th Aeronautical System Squadron (AESS). Thus, the study covers Predator's navigation to standard processes via ACTD, Big Safari, and finally 658th AESS.

In addition, the study relies on personal accounts by former and current employees of the Predator and Big Safari program offices, as well as published histories. Internal and external program office documents were utilized throughout the entire study.

Methodology

A case study methodology is used to examine the transition from rapid to standard acquisition processes. A case history synthesized from primary and secondary sources provides background about the Predator program. For example, discussions with prior researchers helped establish program history. In addition, program office documents and briefings during the examined timeline establish program chronology and provide transition information. Additionally, other literature and books provide Predator program background and operational environment. A literature review on ACTDs, ACTD transitions, and rapid acquisition transitions provided information about other programs.

Study Organization

This thesis is comprised of five main chapters. Chapter 1 provides motivation and background on the research questions. This section also establishes the boundaries and expectations of the thesis. Chapter 2 provides a brief history of the Predator program. The focus is on Predator's origin and operating environment up to the beginning of the study timeframe. This section provides context to the remaining discussion. Chapter 3

compares and contrasts the Predator's program origin and operating environment with the path of a standard program. It highlights the difference in documentation, processes, and oversight between rapid and standard acquisition processes. Chapter 4 explores several areas affecting Predator's transition from rapid to standard processes with a focus on the successes and challenges. Chapter 5 concludes with considerations for future programs.

Literature Review

There is significant material written about Predator's operational and acquisition success. For example, Dr. Mike Thirtle discusses the Predator ACTD during the initial Predator transition planning from an ACTD into an AF program. He was the first to discuss successes and issues with Predator's transition in 1996 to the defense acquisition system. For more information on the background of the Predator program, refer to Thomas P. Ehrhard's PhD dissertation. His book provides the most comprehensive historical coverage of unmanned aerial systems.

There is also increased research interest in other military services' acquisition programs transitioning from rapid programs into standard acquisition programs. Recent examples from both the Navy and the Army describe program transitions and impacts. Two are especially noteworthy. First, Matthew T. South wrote a thesis titled "Transitioning Advanced Concept Technology Demonstrations to Acquisition Programs" that discusses challenges of transitioning ACTDs into the standard acquisition process. Second, COL Anthony S. Pelczynski wrote a thesis titled "Rapid Acquisition Impact on Major Defense Acquisition Programs" in 2010 discussing the rapid acquisition process influence on Army programs. Both works provide a broader context to understanding problems associated with rapid acquisition.

The Navy and Army program studies provide excellent explanations of rapid acquisition programs and many issues associated with transitioning to standard processes. However, these studies do not address programs of the size and complexity of Predator. The history, wartime context, scope and diversity of requirements, complications and challenges of Predator present the opportunity to evaluate the transitioning process as never before. This review is made easier because the Predator program was successful in delivering assets that significantly contributed to the war effort. Through this paper, the intent is to contribute to the ideas and recommendations that will enhance the process of transitioning a program from rapid to standard acquisition.

CHAPTER 2

PREDATOR OVERVIEW

Introduction

The following is a brief overview of the Predator program history. The focus on this section is not to provide a comprehensive history but to capture significant events and provide program conditions prior to 2006. There are more through histories available for further reading. This section focuses on describing several key events that contributed to creating Predator's operational environment. The operational environment consists of all the elements that contribute to the program's existence. For the purpose of this study, the elements are in two categories: acquisition procedures and culture. The former are the rules that government acquisition programs follow. The later consists of the intangible concepts that contribute to the results orientated mindset. The combination of these two categories contributed to the Predator program's operational success. These same elements ultimately affected Predator's transition to standard acquisition processes.

Predator History

Unmanned aerial system (UAS)[*] technology that eventually evolved into what is now Predator capability traces back to projects supporting the Vietnam conflict. This summary skips that section of history and begins with the Defense Airborne Reconnaissance Office (DARO), the organization that demonstrated medium altitude

[*]The terms UAV and RPA describe the unmanned air vehicle. The term UAS defines the unmanned air vehicle and the supporting sensors, communication system, and ground control station necessary for the system to operate.

UAS capability.[†] The DARO was a civilian organization created in November 1993 under the Deputy Undersecretary of Defense for Advanced Technology.[1] The DARO resulted from perceptions by Congressional staffers and Office of the Secretary of Defense (OSD) officials that the military services did not focus on achieving fast, effective, and low cost UASs.[2] As a direct report organization, DARO had full control of the services airborne reconnaissance budgets and was solely responsible for technology development.[3]

A major issue with the DARO was its exclusivity and lack of involvement from the services. This resulted in the DARO being responsible for developing the entire UAS architecture including such items as what sensors were incorporated, the data link configurations, standards for the data relays, and the ground control station (GCS) configuration. DARO accomplished the development mostly without input from the people who would have to operate the system.[4] During DARO's management, medium altitude UAS technology made significant advances to incorporate global positioning system and beyond line of sight capability that helped demonstrate medium altitude UAS effectiveness.[5]

In April 1994, OSD established the Advanced Concept Technology Demonstration (ACTD) program. The ACTD program was created "to assess the military utility of a significant new capability and to conduct that assessment at a scale size adequate to clearly establish operational utility and system integrity."[6] The intent was for ACTDs to be a pre-standard acquisition process designed to reduce technology development and demonstration of military capabilities.[7] The goal was to deliver

[†]Medium Altitude UAS typically operate between 10,000–30,000 feet.

equipment to operators who would provide input on the product's military usefulness and effectiveness before implementing a full standard acquisition program.

In 1994, DARO's medium altitude UAS program became the Predator ACTD, one of the first ACTDs created. Predator's ACTD contained a series of incremental tasks over a thirty month period. The first task was for the Predator system to demonstrate GCS integration with sensor and communications capability.[8] The eighteenth month goal was to continue demonstrating Predator operations with an additional sensor and an improved communication system.[9] The final goal of the Predator ACTD was to have ten fully capable tactical endurance UASs in the same configuration within thirty months.[10]

A major aspect of ACTDs was demonstrating military utility of the capability. Predator had the opportunity to meet this requirement by supporting several real-world operations during the timeframe of the ACTD. Predator's first operational deployment was supporting Nomad Vigil in the Balkans from July to October 1995. This was followed by more significant deployments to Bosnia supporting Nomad Endeavor from March 1996 to December 1997 and again from March 1998 through November 1998. These experiences helped identify and resolve system limitations. Two examples of system enhancements involved de-icing wings and improved voice relay. Additional improvements focused on how best to integrate the system into the battle space. The combined technical and concept of operations improvements enabled Predator to refine its capabilities and increase its exposure.

Predator began to gain the interest of senior AF leaders during the reduction of airborne reconnaissance assets at the conclusion of the Cold War. Several people believed that Predator could fill the capability gap by providing airborne intelligence,

surveillance, and reconnaissance (ISR). Senior AF leaders worked diligently to move the program into the AF portfolio when the ACTD concluded. Their efforts were rewarded in December 1995 when then Vice Chairman of the Joint Chiefs of Staff, Admiral William A. Owens, sent a Joint Requirements Oversight Council Memorandum (JROCM 151-95) to the Secretary of Defense recommending Air Combat Command take the lead for continuing the Predator program.[11]

In order for the Predator program to transition to the Air Force, the Joint Requirements Oversight Council (JROC) had to determine that the ACTD demonstrated military utility. In February 1996, the JROC concluded that Predator met the objectives of the ACTD by demonstrating military utility. They determined Predator's usefulness for surveillance and monitoring, target location, reconnaissance, and battle damage assessment.[12] Furthermore, the JROC recommended a procurement program of thirteen systems with four aircraft in each system.[13]

In 1998, Predator became the first ACTD program to transition into the formal DoD acquisition process and managed by a military service. Congress solidified this decision in a report to the Intelligence Authorization Act for Fiscal Year 1998, which officially transitioned the Predator ACTD into the Air Force.[14] This transition was unique because not only was it the first but Congress also directed which organization within the AF should manage the program. The Act stated that Congress was "interested in the rapid, flexible, and innovative acquisition approaches that hallmark Big Safari, and it strongly urges the Assistant Secretary of the Air Force (Acquisition) to consider using Big Safari streamlined acquisition and management program for Predator."[15] This

additional ruling was one of the most significant decisions that influenced the Predator program's processes and culture.

Big Safari is a program office located at Wright-Patterson Air Force Base, Ohio that serves as the AF acquisition special projects division. Since 1952, a goal of the Big Safari office has been to acquire one-of-a kind, highly classified, airborne surveillance assets using streamlined acquisition and management techniques.[16] Prior to September 2001, it was typical for Big Safari to have approximately twenty-five projects and be responsible for logistically supporting fifty different types of airplanes.[17]

Big Safari is similar to ACTDs in that both want to lessen the timeline from developing to fielding. Big Safari accomplishes this by leveraging from known, proven, and non-developmental technologies. They also reduce the number of acquisition reviews, reduce and modify testing requirements, and significantly reduce the amount of documents typically required of standard acquisition programs.[18] Their focus is on delivering limited quantities of state-of-the-art capabilities in less than perfect packaging. By using streamlined acquisition and management techniques, Big Safari attempts to field the warfighter an 80 percent solution as rapidly as possible.[19] The Big Safari model is effective for developmental creativity for prototypes and limited quantity programs. For the anticipated fleet size of thirteen Predator systems, Big Safari's acquisition model was an excellent fit.

During the next eight years, from 1998 to 2006 while Big Safari managed the program, the original construct changed as several new technologies incorporated into the Predator system. Three of these were the ability to designate a target with a laser, the ability to fire weapons, and the ability to project live streaming video on handheld units.

Each of these technologies resulted in revolutionary capabilities and has become an enduring requirement for not only Predator but also for Reaper (MQ-9), the follow-on program. The Big Safari culture was pivotal to the success of implementing new technologies in accelerated timeframes. A review of the previously mentioned three examples will illustrate how Predator's operating environment enhanced the success of developing and implementing new technologies.

The Secretary of the Air Force acquisition office initiated the laser designator requirement. Subsequent to the downing of Scott O'Grady's plane in Kosovo in 1995, operational constraints were put on pilots that limited their ability to be effective. The United States wanted to reduce the likelihood of both military and civilian causalities. Since Predator was able to fly at high altitudes and could provide critical reconnaissance information without endangering another pilot, Predator was in a unique position to fill the capability gap. The system was good at locating targets, but operators had trouble communicating position information to strike aircraft in order for them to engage targets.[20] The Big Safari team solved this problem by replacing the existing sensor with one that incorporated both a camera and a laser designator.[21] They completed the design, engineering, manufacturing, and installing within three weeks of receiving direction. The team demonstrated laser designation capability which allowed another aircraft to fire a missile based on where Predator aimed its laser.[22] About a month later, the laser designator was operationally used to aid an A-10 pilot to hit a target.[23] General John Jumper, Chief of Staff Air Force called this a breakthrough transforming Predator from a surveillance system into a targeting system.[24] This demonstration was completed in less

than two months and expanded Predator's capabilities from only providing ISR to also guiding fires.

General John Jumper was one senior leader who took a personal interest in Predator's development. He believed that by enabling Predator to fire weapons the program could provide even more combat power. In his mind, this was the next logical step to reducing the "kill chain" timeline.[25] This enhancement would reduce the need to rely on additional aircraft to fire weapons on Predator identified targets. General Jumper told the Big Safari program office to incorporate weapons onto Predator within four months.[26] With his direction, the Big Safari team developed two courses of actions to integrate Hellfire missiles.[27] In order to decide which option to pursue, General Jumper had a meeting with the contractor, General Atomics Aeronautical Systems Incorporated (GA-ASI), and the Big Safari team. After General Jumper held a private conversation with GA-ASI's president, he told the government and contractor team to pursue both the high risk and medium risk courses of action.[28] Within the four month timeline, Big Safari demonstrated Predator firing a Hellfire missile in operations in Afghanistan.[29] This was a major change in how Predators could contribute in combat operations. The ability to fire Hellfire missiles enabled Predator to increase contributions in both OIF and OEF.

Another one of Predator's main assets is the ability to provide real-time video to people in various locations at the same time. This technology called Remotely Operated Video Enhanced Receiver (ROVER), began as an urgent warfighter requirement for the AC-130 Gunship in fiscal year 2001. ROVER capability transitioned to ground forces and allowed them to see the same video as the Predator pilot and military and civilian leadership.[30]

The implementation of air to ground ROVER was the result of a single special operations soldier who personally contacted Big Safari and described his requirement to them. The soldier went to the Big Safari office in Dayton, Ohio while on leave and spoke to with several people. He explained to them that he wanted to be able to receive Predator video on the ground as far as 100 miles away.[31] This would enable his team to see the area in front of them to know the situation prior to their arrival.[32] With this one person's articulated requirement, the Big Safari team went into action. They were able to demonstrate this technology and field a solution in two weeks.[33] The ROVER capability has become so popular that a range of aircraft like F-16s, A-10s, and B-1Bs are equipped to transmit to ground ROVERs.

Big Safari's ability to process diverse operational requirements, initiate creative solutions and secure special funding played a significant role in Predator's achievements in incorporating laser designation, weapons capability, and ROVER technology. The three examples represent the type of capabilities, timelines, and processes that were normal for the Predator acquisition team. The accelerated acquisition model was integral to the Big Safari team's success. The model has enabled them to be trailblazers in achieving rapid fielding of critical capabilities. The synergy of using a highly specialized team, following flexible processes and delivering important solutions quickly contributed in achieving goals.

During 2004 and 2005, the Predator system saw increased overseas operations supporting OEF and OIF. The demand and requirements for Predators continued to grow well past the original requirement of thirteen systems, and in March 2005 the AF announced its intention to expand the fleet to as many as fifteen squadrons.[34] The size of

the Predator program had grown larger than the typical Big Safari project. To alleviate this situation, the AF decided to create another program office to manage the Predator effort. The AF assured the Congressional Defense and Intelligence Committees "that this new management structure will not impede the rapid, flexible, and innovative approaches that hallmark the Predator program today."[35] In July 2006, the AF activated the 658th AESS to serve as the new Predator program office. The expectations of the new program office were to "use streamlined management tools to rapidly prototype, modify, and field Predators with increased combat capability, while at the same time, ensure core program activities . . . are normalized[‡] to meet the demands of large-fleet operations."[36] This was the birth of the "normalize but don't slow down" concept that became the battle cry of the organization throughout the next phase from 2006 through 2010.

Summary

From 1994 through 2006, Predator experienced several distinct phases. The time from DARO management to becoming an ACTD is the period where Predator technology evolved to become militarily useful. This period was noteworthy because technologies such as global positioning technology became available. At the completion of the ACTD, Predator transitioned from a demonstration into the AF's Big Safari office. The most rapid acquisition development and operational fielding of the system occurred while managed by Big Safari. Additionally, it was during this time that Predator developed from a passive ISR asset into a system that could laser designate a target and fire Hellfire missiles. Massive expansion in fielded capability and requirements hallmarked the final

[‡]Throughout paper "normalized" refers to using standard processes.

transition, from Big Safari to the 658th AESS. This last transition into a dedicated acquisition program office resulted in the addition of standard acquisition processes.

Starting with the ACTD through the formation of 658th AESS, Predator followed a non-standard acquisition process. The way the program handled requirements, made decisions, and achieved timelines were consistent with rapid acquisition programs. The fact that Congressional input led the AF to put Predator in the Big Safari organization signified that the rapid acquisition processes should be applied. For eight years, the program defined its own method of processing new requirements. The Big Safari organization also fostered an environment where quick decision-making and less than perfect solutions set the standard. However, once Predator's requirements grew to the size of a standard acquisition program, a different management style became necessary. The 658th AESS organization was responsible for this task. This transition into a dedicated acquisition program office resulted in the addition of standarad acquisition processes. What remains is a discussion of the issues germane to Predator's successes and chllenges of increasing the incorporation of standard processes.

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[2]Thomas P. Ehrhard, *Air Force UAVs: The Secret History* (Report, Mitchell Institute Study, 2010), 46.

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[4]Ibid.

[5]Ibid., 49.

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[14]U.S. House of Representatives, H.R. 1775, *Intelligence Authorization Act for Fiscal Year 1998*, 105th Cong., 1st sess., 1997, sec. 603, http://thomas.loc.gove/sgi-bin/query/z?c105:H.R.1775 (accessed January 5, 2012).

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[17]Walter J. Boyne, "How the Predator Grew Teeth," *Air Force Magazine* (July 2009), 43.

[18]Richard Whittle, *Predator's Big Safari* (Report, Mitchell Institute Press, 2011), 11.

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[20]Frisbee, "Weaponizioning the Predator UAV," 54.

[21]Boyne, "How the Predator Grew Teeth," 43.

[22]Whittle, *Predator's Big Safari*, 14.

[23]Ibid., 15.

[24]David Kohn, "The Predator," *CBSNEWS.com*, http://www.cbsnews.com/stories/2003/01/07/60II/main 535569.shtml (accessed January 17, 2012).

[25]Boyne, "How the Predator Grew Teeth," 44.

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[27]Ibid., 19.

[28]Frisbee, "Weaponizioning the Predator UAV," 75.

[29]Gen Tommy Franks with Malcolm McConnell, *American Soldier* (New York: HarperCollins, 2004), 293.

[30]Frank Grimsley, "The Predator Unmanned System: From Advanced Concept Demonstrator to Transformational Weapon System" (Presentation, Technology Maturity Conference, Virginia Beach, VA, September 9-12, 2008).

[31]Whittle, *Predator's Big Safari*," 27.

[32]Ibid., 28.

[33]Ibid.

[34]Col Scott L.Grunwald, "Package (BLUE) Predator Program Office" (Staff Summary Sheet, April 20, 2005).

[35]Ibid.

[36]Ibid.

CHAPTER 3

STANDARD AND RAPID PROCESSES

Introduction

The previous chapter reviewed the evolution of the Predator program beginning prior to becoming an ACTD through the program's transition into a standard AF acquisition program. The previous chapter also discussed the expectation for Predator to perform rapid integration of new technologies while receiving requirements from various methods. Three examples, laser designation, weapons employment, and ROVER capability illustrated the expection of how the system incorporated technology improvements. This chapter builds on this foundation by defining the processes that a standard acquisition program would have used during the same time frame. This will help outline how Predator differed from a standard program from the beginning through its transition into the AF acquisition process. Comparing the standard acquisition process to Predator's experience will highlight the complexity of issues affecting Predator converting to the standard acquisition process.

Standard Acquisition Cycle

When Predator entered the ACTD program in 1996, the DoD standard acquisition process was highly complex, with personnel receiving direction from over 30,000 pages of regulations issued from 79 different offices.[1] The focus of continuous reform, the DoD acquisition process is comprised of three interdependent processes that are managed separately. See figure 1. The Planning, Programming, Budgeting, and Execution (PPBE), Joint Capabilities Integration and Development System (JCIDS), and DoD 5000.2

Defense Acquisition System (DAS) each have their own area that contributes to the success of providing acquisition solutions. The PPBE main emphasis is to provide financial resources for the acquisition program using a time-phased approach. The JCIDS process helps identify and assess requirements. The DoD 5000.2 defense acquisition system involves the management process that develops, fields, and sustains the actual system. Each of these components has its own set of standard procedures that acquisition programs follow.

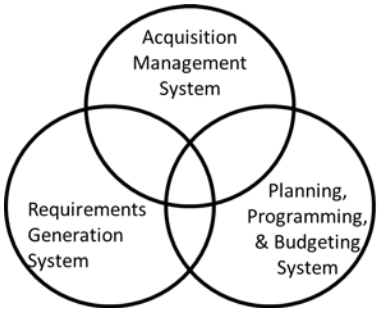

Figure 1. DoD Decision Support Systems

Source: Chairman, Joint Chief of Staff, Joint Chiefs of Staff Instruction (CJCSI) 3170.01B (Washington, DC: Government Printing Office, April 15, 2001).

Predator and the Standard

During the ACTD demonstration, the Predator program was not an official DoD acquisition program and therefore did not follow the standard. In 1998, Predator entered the acquisition process when Congress directed the program to be managed by the Big Safari office at Wright-Patterson, AFB, Ohio.[2] Big Safari's core competency is with

small non-standard quick reaction capability programs. As a result, Predator transitioned from an ACTD into a rapid acquisition program, which did not fully utilize standard acquisition processes. Comparing the Predator program while managed by Big Safari from 1998 through 2006, to the PPBE, JCIDS, and DAS processes will show the differences between the two processes.

The government has modified the requirements for the PPBE, JCIDS, and DAS processes over Predator's life cycle. The following explanations of the DoD system will focus on the acquisition practices that existed in 1998 when Predator became an official AF program. Each subsequent section begins with a definition of one of the three elements of the acquisition process. Following the definition will be two examples. The first example will be the F-22 Raptor, a program that followed the standard processes during a similar timeframe. The second example will highlight how Predator deviated from the standard.

Planning, Programming, Budgeting and Execution

In 1962, Secretary of Defense Robert McNamara began the first DoD resource system called Planning, Programming, and Budget System. The DoD restructured the program in 2003 to the current Planning, Programming, Budget, and Execution (PPBE). PPBE allocates resources consistent with the national objectives provided by the President. The Secretary of Defense interprets these requirements and provides policy guidance and prioritized goals for the DoD community.[3] Within this framework, the PPBE aligns the Secretary of Defense's guidance with the country's fiscal constraints.[4] The PPBE process is comprised of four different phases: Planning, Programming, Budgeting, and Execution. The overall objective of each phase is to support the

President's budget at the start of a new calendar year. These phases help to coordinate requirements and fiscal constraints. Each phase operates independently and overlaps.

The Planning phase requires coordination between the Office of Secretary of Defense, Joint Staff, and DoD components. It begins with fiscally constrained guidance of the national strategy. The result of this phase is the alignment of military department and defense agency goals with the overarching DoD objectives. This work culminates in the Joint Programming Guidance that provides the final guidance and priorities.

The Programming phase develops programs that can meet the planning guidance and priorities within the given fiscal considerations. During the programming phase, OSD staff review and integrate each program proposal into the overall defense strategy. Programs establish a time-phased allocation of financial resources for up to six years into the future.

The Budgeting phase provides information for each program for the next two years along with documentation defending the program's cost and purpose. Following a review by the Under Secretary of Defense (Comptroller) and the Office of Management and Budget is a series of Congressional hearings about the budget. A program budget decision documents the outcomes from these reviews and hearings. After each program's review is completed, the OSD staff compiles the program budget decisions into one final document. Then the Deputy Secretary of Defense approves the final product and sends it to Congress as a part of the President's Budget.

The Execution phase serves to provide feedback to senior leaders about how effective the programs are with the funds previously provided. There are a series of reviews and metrics used to gather data and analyze a program's financial status. The

goal of this phase is to make sure that programs use the funds appropriately and that programs are meeting financial goals.

Raptor and Planning, Programming, Budgeting, and Execution

Following the end of the Cold War, Congress saw a reduced need for an advanced fighter airplane. Raptor was originally started to match capabilities with the Soviet Union. When this threat changed, United States politics necessitated a reduction in defense spending and the impact on the Raptor program was dramatic as shown in figure 2. As a result of the budgetary pressure, in 1984, an AF Systems Acquisition Review Council imposed a $40M dollar limit on the program. This trend continued in 1990 when Congress changed the original plan, reducing production from 72 to 48 aircraft a year. In 1993, the total production shrank to 442. As time passed, Congress continuously reduced this number until ultimately, the Raptor program produced[§] 179 aircraft[5].

During this process, Congress capped the program's total funding which necessitated the program to implement a "buy to budget" funding profile. As the program struggled to balance new technology performance with affordability, the pressure increased. The cuts in the total procurement quantities put additional strain on the program. The large fixed cost to develop the plane resulted in the purchase of fewer, but more expensive aircraft. The increased time in the defense acquisition system ultimately decreased efficiency in the process. The result was higher cost and lower produced quantities.[6]

[§]The total quantity of F-22s is 187. There are six additional Production Test Vehicle aircraft and two additional Engineering and Manufacturing Development aircraft. These eight bring the total to 187.

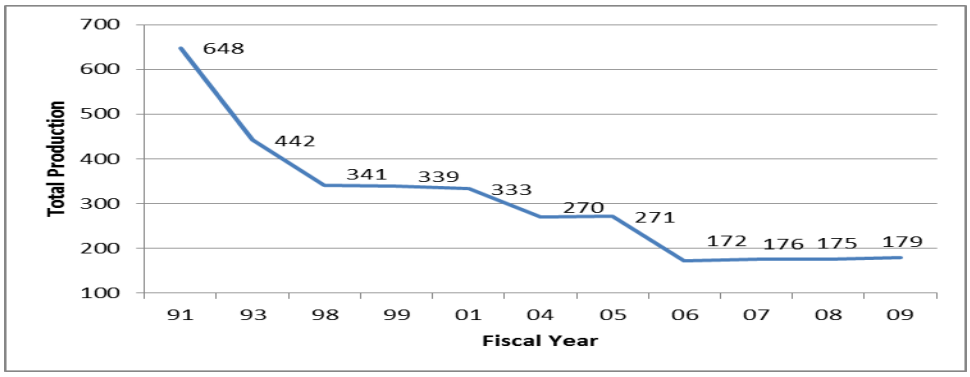

Figure 2. Raptor Production

Source: Created by author with data provided by Jeremiah Gertler, "Air Force F-22 Fighter Program: Background and Issues for Congress," Congressional Research Service, December 22, 2009.

Predator and Planning, Programming, Budgeting, and Execution

The original funding methodology established for Predator was to maintain a limited fleet size with some upgrades and retrofits to bring the fleet to a final configuration. Consistent with the philosophy of a small fleet, there was little money planned or budgeted for significant research and development. See figure 3. The primary funding[**] was for procurement to acquire more of the same systems. This philosophy remained consisted for four years from 1998 to 2001.

[**]From 1998 - 2007 both Predator's and Reaper's program budgets were contained in Predator's fiscal line.

Table 1. Predator Budget

	FY00	FY01	DERF	FY02	FY03	FY04	FY05	FY06	Total
RDT&E Request	4.0	3.7	0.0	3.8	13.8	41.0	81.3	61.0	
RDT&E Appropiated	4.0	3.7	0.0	3.8	15.8	41.0	83.9	63.5	
Delta	**0.0**	**0.0**	**0.0**	**0.0**	**2.0**	**0.0**	**2.6**	**2.5**	7.1
Production Request	38.0	22.1	0.0	30.5	124.1	208.1	178.5	155.9	
Production Appropiated	58.0	32.1	191.9	52.6	150.1	223.4	208.5	155.9	
Delta	**20.0**	**10.0**	**191.9**	**37.1**	**26.0**	**15.3**	**30.0**	**0.0**	330.3

Source: Created by author with data provided by SAF/AQI Office. Note: DERF is Defense Emergency Relief Fund.

After September 2001, Predator's funding profile dramatically increased to include more production items. The team abandoned the original acquisition plan of procuring only replacement air vehicles every year. The political environment was favorable for the Predator program, but the office remained small with limited oversight. For example, when the AF scrapped the original plan, no one established a new acquisition plan with a total fleet requirement to take its place. Instead, Predator requirements were modified every year. Further, the program did not use the traditional PPBE process to outline future requirements for the next six years. For each fiscal year from 2000 through 2006, Predator received supplementary money from congress which added to its baseline budget request. However, after September 2001, the amount of additional funding from Congress increased. Between the AF's FY2002 and FY2003 budget request, Congress appropriated a 400 percent increase in production funds. Congress gave the additional funding for increasing the number of air vehicles, upgrading capabilities for both the ground control station and air vehicle, and increasing reliability and maintainability. The primary focus of the funds was to deliver war-fighting

capability, as opposed to studies or other items necessary to define the total requirement or incorporate standard practices. figure 3 shows the growth in air vehicle production.

While other programs with established PPBE and acquisition plans were fighting to keep their funding, Predator often had an abundance of funds. In the seven years from FY2000 through FY2006, during Big Safari's management, the Predator program received $330M of additional funding outside the program's nominal PPBE plan. This influx of additional funding enabled the warfighter to receive more combat capability, but it also impeded the program's ability to standardize. The increased funding caused the production quantities to fluctuate, which affected every aspect of the program. These unanticipated adjustments also created changes for the contractors manufacturing the equipment. The programs's need to create new acquisition strategies for added funding became a recurring challenge each year.

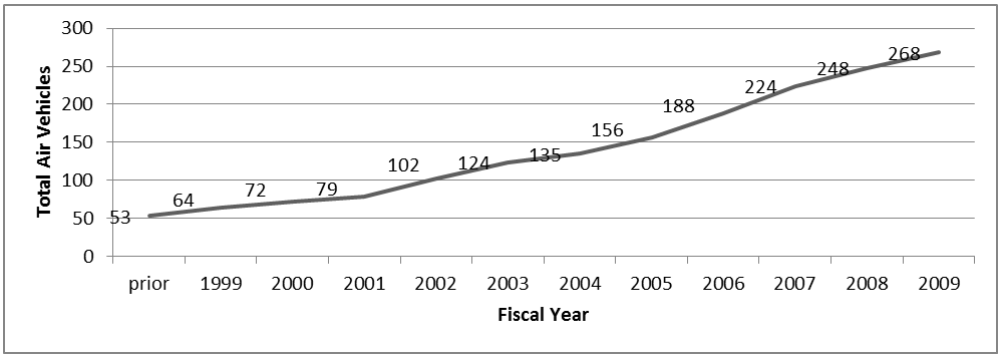

Figure 3. Predator Air Vehicles Procured

Source: Created by author from data provided by the Predator Program Office, Wright Patterson Air Force Base, Ohio.

Joint Capabilities Integration and Development System

In 2003, a new DoD requirements generation process called JCIDS began. JCIDS role in the acquisition process is to aid the Chairman, Joint Requirements Oversight Council (JROC) in providing advice to the Secretary of Defense on joint military capabilities.[7] JCIDS is a capability-based process designed to meet the strategic guidance provided in the President's National Defense Strategy and more specifically the Chairman, Joint Chief of Staff's National Military Strategy. The process is methodical in that it utilizes a defined analytical method to identify future military requirements or capability gaps between what technologies already exist and future requirements.

The process begins by analyzing the strategic guidance to identify if there are shortfalls in military capability in order to meet the intent. If a capability gap is identified, the Doctrine, Organization, Training, Materiel, Leadership, Personnel, Facilities (DOTMLPF) technique analyzes it. The DOTMLPF process examines if changes to doctrine, training, existing materiel, leadership, personnel or facilities could satisfy the capability gap. The purpose of the DOTMLPF technique is to exhaust all non-material solution possibilities before recommending a new acquisition program. If at the conclusion of the DOTMLPF analysis it is determined that a new materiel solution is required, the intended military user creates an initial capabilities document. The purpose of the initial capabilities document is to identify and define technical requirements needed to close the capability gap. Next, the JROC verifies that the requirements in the initial capabilities document met the need to eliminate the capability gap and the idea enters the DAS.

Prior to 2003, the process used in place of JCIDS was the Requirements Generation System (RGS). Both RGS and JCIDS have the same objective of identifying requirements. The main difference between the two systems is their approach. RGS method of identifying requirements focused on fielding weapon systems for a known or perceived threat. Whereas, JCIDS focuses on building capabilities in order to meet strategic guidance.

Similar to JCIDS, the RGS process also required JROC approval prior to entering the DAS. In order to receive JROC approval, the military user had to write a Mission Need Statement (MNS) to identify and support the need for a new or improved capability or for a cost savings.[8] MNS is a non-system specific statement describing a necessary operational capability.[9] MNS approvals occur by various organizations depending on the proposed program dollar value. For programs valued under $355M (FY96$ constant $), the Chiefs of the Military Services and the Commanders in Chief of Unified Commands could validate and approve their own MNS.[10] For all other programs, the JROC validated and approved the MNS.[11] When the JROC approved an MNS they were confirming that they had exhausted the DOTMLPF analysis and determined that a nonmaterial solution could not fill the capability need.

Raptor and the Requirements Generation System

The Raptor program originated from plans addressing how the United States would fight a war with another major power. In the 1970's the Soviet Union was developing two fighter aircraft, the MiG-29 and the Su-27. There was concern that the Soviet Union's air-to-air fighter aircraft capabilities would end the F-15's air dominance.[12] The United States government conducted several studies over many years

to understand the extent of potential Soviet Union air-to-air capabilities. In 1975, General Dynamics and McDonnell Douglas completed an initial study that preceded six additional studies about potential advanced fighter aircraft capabilities.[13] The basic motivation for the studies was identifying the most likely design concepts and enabling technologies to use as the foundation for the acquisition program.

All of the previous efforts culminated when the Soviet Union successfully demonstrated the MiG-29 in October 1977. The United States started formalizing an official acquisition program to respond. In 1980, the military documented the requirement for an improved air-to-air strike capable aircraft in an MNS.[14] The JROC approved the MNS through the RGS process and the program transitioned to the DAS.

Predator and the Requirements Generation System

A major difference exists between Predator and Raptor pertaining to the amount of research conducted prior to entry into the acquisition system. Predator became an ACTD to respond to an urgent requirement validated by the Joint Chiefs of Staff in 1993.[15] The JROC saw Predator as a potential solution to increase reconnaissance situational awareness. As a result, no one wrote a specific Predator MNS prior to entering DAS. There was no additional research conducted to understand all the possible capabilities. The military was satisfied with the capabilities demonstrated throughout the ACTD. However, during the ACTD's operational deployments, the user identified several improvements such as de-ice wings that would allow the system to perform better. At the end of the ACTD, the AF requested four modifications incorporated into the system prior to transition to the AF.

The JROC was involved in the early stages of Predator's transition from an ACTD into AF acquisition management system. In November of 1996, the JROC issued the memorandum that stated 16 systems were required to meet all needs[16]. Two months later in January 1997, the JROC issued a memorandum that established Predator's four key performance parameters in the areas of mobility, presence, sensors, and ground control system capabilities.[17] In July 1997, the JROC approved the operational requirements document (ORD).[18] Consistent with the standard process, the JROC issued these memorandums prior to the transition from an ACTD into an acquisition program.

Once Predator officially transferred to the AF and into the Big Safari organization, the program primarily used rapid acquisition processes. Various sources levied requirements on the program without prioritization and clearly defined technical specifications. The three previous examples discussed in chapter 2 illustrated the various processes to include the laser designator, Hellfire missile, and ROVER capability. Each of these requirements came from a different source and the technical threshold was for it to work. This accelerated capability delivery is in stark contrast to the process of well-defined and monitored requirements utilized by Raptor.

Once users realized the potential of the Predator system, additional requirements emerged requiring a new management style. In 2003, James Roche, the Secretary of the Air Force, and General John Jumper, Chief of Staff of the Air Force, created an oversight organization called Task Force Arnold to help manage the program. Task Force Arnold operated from 2003 until 2005 with the main purpose of the determining what capabilities the system should incorporate.[19] They established a priority list and technical baselines. Task Force Arnold also helped communicate funding and technical

requirements throughout the PPBE cycle. Task Force Arnold was an atypical program management technique. This was a unique arrangement for Predator and remained effective until Secretary Roche stepped down as Secretary of the Air Force and Predator transitioned to the 658th AESS.

Defense Acquisition System Policy and Guidance

Once the JROC concurs that all non-material solutions are exhausted and that a material solution is necessary, the defense acquisition system (DAS) begins. In 1971, the Office of Secretary of Defense created the DAS, which consists of the directives and instructions. The most important directive is DoD Directive 5000.1, which consolidates and details acquisition policy. Similarly, the most significant instruction is DoD Instruction 5000.2 that provides guidance on how to implement the policy. The requirements in DoD Directive 5000.1 have continued to evolve as executive office administrations and focuses have changed. In 2009, Deputy Secretary of Defense William Lynn commented that approximately 130 studies of acquisition reform occurred following World War II.[20] However, the basic premise behind the DoD 5000 series is to create a monitoring system for major acquisition programs.

The policies initiated in 1996 were pertinent to all programs of the time. Paul Kaminski, Under Secretary of Defense Acquisition and Technology (now called USD AT&L) in 1996 wrote, "the intent of this revision is to define an acquisition environment that makes DoD the smartest, most responsive buyer of the best goods and services, that meets our warfighters' needs, at the best dollar value over the life of the product."[21] In an effort to empower program managers by increasing their latitude to make decisions about

their projects, the government reduced policy documents from over 1,000 pages to 160 pages.[22] The new policy incorporated the use of non-traditional acquisition techniques such as rapid prototyping and ACTDs into the process.[23] Predator began as an ACTD under this policy. There was a preference for acquisition programs to use contractor-provided logistics support instead of government-provided logistics.[24] Lastly, programs could increase the use of commercial products in acquisition projects because many viewed the private sector as more innovative. The speed and affordability of programs would increase by adopting commercial technology.[25]

Management System

The standard method of implementing the DoD 5000 series guidance in 1996 consisted of several milestones that signified a major program accomplishment and phases that contained several tasks. The milestones number sequentially from Milestone 0 to Milestone III where each milestone represents a transition from one phase into another phase. The milestones are a series of meetings to establish whether a program has met the conditions required to proceed into the next phase. A multi-function team called the Defense Acquisition Board (DAB) has the authority to determine whether a program has completed the requirements for each milestone. The DAB is a DoD team of senior individuals who advise the USD (AT&L) on major acquisition programs. USD (AT&L) chairs the DAB and the Vice Chairman, Joint Chief of Staff (VCJCS) serves as the DAB Vice Chairman. Several additional people may serve on the DAB at the discretion of USD (AT&L). Figure 4 depicts the list of mandatory and some potential DAB members. Each individual represents a unique group with their own perspectives and interests. The time necessary for programs to coordinate and reconcile each group's needs is not quick.

Acquisition programs need to ensure each groups' interests are met in order to receive milestone approval.

Table 2. DAB Membership

Mandatory DAB Members	Potential DAB Members
USD (A&T) - Chairman	Director of Defense Research and Engineering
VCJCS - Vice Chairman	Assistant Secretary of Defense (Econmic Security)
Principal Deputy USD (A&T)	Assistant Secretary of Denense (Nuclear, Chemical, and Biological Defense)
Under Secretary of Defense Comptroller	Deputy Under Secretary of Defense (Acquisition Reform)
Assistant Secretary of Defense (Strategy & Requirements)	Deputy Under Secretary of Defense (Environmental Security)
Director of Operational Test & Evaluation	Deputry Under Secretary of Defense (Logistics)
Director of Program Analysis and Evaluation	Director of Defense Procurement
Acquisition Executives of Army, Navy, Air Force	Director of Test, Systems Engineering and Evaluation
OIPT Leader	Chairman of Cost Analsysis Improvement Group
Program Executive Officer	Deputy General Counsel (Acquisition and Logistics)
PM	
DAB Secretary	

Source: Department of Defense, *Defense Acquisition Guidebook*, https://acc.dau.mil/CommunityBrowser.aspx?id=323136#10.2.1 (accessed January 10, 2012).

Although Milestone I represents the official beginning of a new program, significant work is completed prior to this event. See table 2. The DAB reviews and approves the MNS, a product of the JCIDS process prior to a program entering Phase 0, Concept Exploration. During Phase 0, the office completes concept studies to evaluate the feasibility of different ideas and to explore the range of possible alternative concepts. Potential cost, schedule, and performance parameters are determined for ideas that appear to provide reasonable solutions.

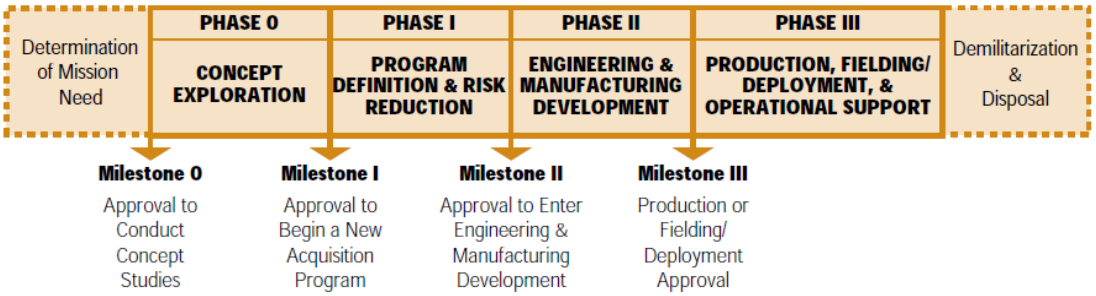

Figure 4. Defense Acquistion Phases and Milestones

Source: DoD Regulation 5000.2-R Mandatory Procedures for Major Defense Acquisition Programs (MDAPS) and Major Automated Information Systems (MAIS) Acquisition Programs, October 6, 1997.

Milestone I approval grants authority to enter into the Program Definition and Risk Reduction phase. The DAB verfies that the performance objectives and thresholds support establishing a new program. The DAB may also consider if sufficient people and financial resources are available for the program. In addition, the DAB may review the life-cycle cost requirements to determine if the program is affordable. The DAB also approves the ORD which translates the MNS into more detailed performance specifications.[26]

During Phase I, the main objective is to reduce risk before transitioning to the development phase. Prototyping, demonstrations, and early operational assessments should be included to reduce risk. Prototyping demonstrates that the selected design provides confidence that technologies and processes critical to success are attainable.[27] It is important to conduct tests to demonstrate that the design is stable, that it meets the operational need, it can be logistically supported, and that the design can be produced efficiently.[28] The efforts of Phase I culminate with the Milestone II meeting.

The main objectives of Milestone II is to ensure that sufficient background has been accomplished to demonstrate the design, plan for the cost, and that the schedule is validated before starting actual engineering and manufacturing. At the Milestone II DAB meeting, the primary focus is to determine that the final design is stable and ready for production. Test results completed in Phase I should show that the design is stable, operationally acceptable, logistically supportable, and capable of being produced efficiently.[29] Prototyping should demonstrate that the selected design provides reasonable assurance that technologies and processes critical to success are attainable. The DAB reviews the estimated life-cycle cost and annual funding requirements.[30]

After Milestone II is completed, the program enters into Phase II, the Engineering and Manufacturing Development phase. The main purpose is to refine the best design in order for the manufactures to produce and support it. During this phase, the program can use a low rate initial production (LRIP). LRIP is a technique that allows a company to produce up to 10 percent of the total production quantities in order to work through the manufacturing process. This helps to ensure that the transition to full-rate production is smooth. The LRIP technique also produces production representative items for testing. The goal of Phase II is to complete the engineering process and to validate the manufacturing process.

Milestone III is the last major decision point and is where a program can receive authority to begin full-rate production and initial deployment. Phase III production, fielding, and operational support begin. The main objective of Phase III is to achieve an operational capability that satisfies the mission need and closes the capability gap identified in the RGS process. Successfully completing developmental testing and the

operational assessment is a major accomplishment necessary for a program to begin production and fielding.

In addition to the system of milestone and phases, there is another layer to the DAS. From 1996 to today, all programs have an Acquisition Category (ACAT) classification based on their total program funding. There are four different ACAT levels. See table 3. Major production programs have three categories (ACAT I, II, and III) where ACAT I programs have the largest dollar value. The ACAT I production programs are further divided into two additional categories depending on who serves as the milestone decision authority (MDA), the person who chairs the milestone decision meetings. ACAT ID designation is for programs when the USD (AT&L) is the MDA. Similarly ACAT IC program have the DoD Component Acquisition Executive (CAE) as the MDA. The USD (A&T) has the authority to determine which programs are ACAT ID versus ACAT IC. Typically, a program is designated ACAT ID if there is political or national interest in the project.

Table 3. Acquisition Categories

ACAT ID	$355M RDT&E or $2.135B Procurement (FY96 Constant $), or special interest
ACAT IC	$355M RDT&E or $2.135B Procurement (FY96 Constant $)
ACAT II	$140M RDT&E or $645M Procurement (FY96 Constant $)
ACAT III	All other programs

Source: DoD Regulation 5000.2-R Mandatory Procedures for Major Defense Acquisition Programs (MDAPS) and Major Automated Information Systems (MAIS) Acquisition Programs, October 6, 1997.

A higher ACAT level program receives additional government oversight. For example, ACAT ID programs have to convene an Overarching Integrated Product Team (OIPT) meeting prior to seeking DAB milestone approval. The OIPT determines if the conditions are right for the USD (AT&L) to make a decision about the program.[31] The OIPT will review the series of documents prior to giving its recommendation to the DAB. This process requires that the program office submit the first document to the OIPT six months before the meeting. After the OIPT review is completed, the DAB occurs 20 days later. This additional oversight can add considerable time and effort to a program seeking milestone approval.

Furthermore, numerous regulatory and statutory requirements must be met prior to each milestone decision. For ACAT I programs, there are fifty-six requirements,

twenty-six of which are statuatory and thrity required by regulation.[32] For ACAT II programs, this number is reduced slightly to twenty required by statute and twenty-seven required by regulation.[33] The OIPT, along with the mandatory or additional DAB members, will review these documents prior to the milestone decision authority making a recommendation.

Raptor and the Defense Acquisition System

The Raptor experience illustrates the timeline and complexity for an ACAT ID program to accomplish the DAS milestones and phases. During the pre-Milestone 0 phase of Raptor, studies were completed to identify the capability gap. The studies concluded with the development of the requirement documented in an MNS. In November 1981, these efforts resulted in Raptor achieving Milestone 0 approval to begin the concept definition phase. Seven companies received $1M contracts to explore studies in the concept definition phase. For over a year and a half, from September 1984 through May 1985, each company presented several ideas to the Air Force. After requesting proposals for the demonstration/validation phase, the Air Force delayed the submission date to include the requirement for prototyping, which incorporated 1986 acquisition initiatives. Ultimately, Phase 0 took five years to complete.

Milestone I approval occurred in October 1986. The difficulty of integrating several novel technologies and capabilities was the biggest challenge during Phase I. The program included several formal weeklong AF program reviews to help gain understanding about the technological difficulties and possibilities. The design process also had regular AF involvement where once a year contractors could request changes to specifications. Although these changes continually adjusted the baseline to arrive at what

was possible, it was more change. Approximately four years into this phase, the first prototype was delivered. After this accomplishment, the program experienced typical delays of programs requiring major technological development. In 1989, Raptor delayed full-scale development phase to increase time for engine and avionics technology improvements.[34]

As a result, Milestone II began two years later in August 1991. The Secretary of the Air Force, Donald Rice awarded the next phase of the Raptor program to the Lockheed and Pratt & Whitney team. Their design incorporated reliability, maintainability, and supportability features. At the DAB, the MDA directed that the program complete an operational assessment before requesting LRIP approval. In February of 1997, during this phase of Raptor's development, political discussions about the cost, schedule, and utility of the program introduced more delays. Ultimately, the Raptor program restructured by reducing the total number of production airplanes, eliminating four pre-production airplanes, and lengthened the engineering and manufacturing phase. Finally, Milestone III occurred in 2005.

The timeline prior to Raptor restructuring is consistent with other major acquisition programs that use the standard acquisition process. It is typical for twelve to fifteen years to be required for a major acquisition program to progress through the defense acquisition system.[35] For the Raptor program, it took over ten years to get from Milestone 0 to Milestone II, and this does not include the years of studies and analysis completed prior to Milestone 0 approval.

Predator and the Defense Acquisition System

On August 18, 1997, USD (AT&L) issued the Predator Acquisition Decision Memorandum (ADM) that entered the program into the DAS at Milestone III authorizing full rate production and operational support. This meant that Predator skipped all previous phases and milestones in the acquisition process. The acquisition decision memorandum also established the Predator program as an ACAT II program and delegated MDA to the Air Force.[36] These decisions meant that the program would have lower documentation requirements and less OSD oversight than Raptor and other ACAT ID programs. The original plan in 1997 was to procure a total of thirteen systems where each system consisted of four air vehicles, sensors, communication links, and a ground control station. The plan also included funding for sensors and seven air vehicles per year to account for attrition. In base year 1996, the total life cycle contained $213M for research, development, test, and evaluation, $512M for production, and $697M for operations & support, which totaled $1.422B.[37]

The Predator program was consistent with several other themes of the 1996 DoD acquisition streamlining guidance. The Predator system was mostly a commercially developed item that the government procured. The program structure also relied on contractor provided versus government provided logistics. Additionally, each of the primary contractors for the air vehicle, communication, and sensor provided the majority of maintenance for their systems. The plans created at this time outlined the program's approach in the standard acquisition system and remained unchanged until the next transition to the 658th AESS.

There was a thirteen month period between the completion of the ACTD in 1997 and the program transferring into the AF in 1998. During this time, the team focused on establishing some of the documents and procedures that the program would have completed if it had started at Milestone 0. Specifically, the team clarified requirements, identified the acquisition approach, determined the force size, established funding requirements, completed a life-cycle cost estimate, and wrote a reliability plan.[38] The work accomplished during the thirteen months created a foundation and program structure for the small fleet.

The program team accomplished significant work during the thirteenth month period. Their goal was to prepare the program for AF management with the understanding that the AF would procure limited quantities. Therefore, the team did not attempt to accomplish all of the requirements that would have been completed during Milestone 0, I, or II. For example, the program completed four of the 57 possible ACAT II documents. See Appendix A. Air Combat Command approved the first document, the ORD, in June 1996.[39] AF acquisition headquarters approved the single acquisition management plan (now called an acquisition strategy) and the acquisition program baseline during the summer of 1997.[40] In the fall of 1997, the operational test and evaluation office approved the test and evaluation master plan, the last major document.[41]

Predator should have completed operational test and evaluation (OT&E) prior to a MS III decision. However, the operational test and evaluation office approved the testing plan in 1997 years after Predator had already been operational. The operational test and evaluation report is typically a major consideration for MS III approval. Predator skipped

this requirement by proceeding directly to full-rate production. Operational testing eventually identified several issues that became difficult to fix later in the program.

Predator produced significant quantities of aircraft once the AF granted a full-rate production decision. The total aircraft production was 268. Therefore, using LRIP authority, the AF should have only bought 10 percent, or 27 air vehicles before MS III. However, the program bought more than this during the period between the ACTD and the AF took responsibility.

Typically, OSD penalizes programs for failing to meet financial metrics. This was not the case for Predator. Instead of removing funding, Congress routinely added funding to the program regardless of their ability to meet the established goals. The political environment to field more ISR capability for OIF and OEF created the situation where Congress added additional funds to the program. Because of the importance of fielding Predators, OSD allowed Predator to keep funds even though the program office was behind in obligating the money and not meeting the financial metrics.

Summary

The overarching concept of the defense acquisition system is to provide the warfighter with material solutions, so wars can be won. The process begins when a capability gap is identified and validated through either the RGS or, since 2003, the JCIDS process. The PPBE is used to plan the funding for the development, production, and support. Operational concepts are explored that could be used to meet the need and close the capability gap. After the government selects a particular solution, the team defines specific parameters of the system to create the optimal solution. Then the solution continues refinement through engineering and manufacturing processes into a final

solution. Next, the program produces, fields, and maintains the technical solution. Additionally, this entire process, has a series of checks and balances to monitor the program's performance at meeting technical, cost, and schedule goals.

This structure produces war-fighting products that meet the user's identified capability gap. This process takes approximately ten to fifteen years to complete, provided there are no political or financial issues similar to what the Raptor program experienced. For many capability gaps, this timeline is too long. The United States fought in Iraq for ten years. If the capability gaps identified during the war used the standard process, they would be delivering around the time that the troops were leaving Iraq.

Additionally, the main processes and procedures the standard structure uses lack the flexibility required for rapid acquisition programs. In 1996, DoD introduced a new series of guidance documents with the goal of increasing the speed of delivering capability to the warfighter. This guidance included new concepts like ACTDs and rapid prototyping into the system with the hopes of increasing rapid fielding opportunities. However, it appears that two acquisition processes emerged, one using the standard and one using rapid acquisition techniques. Both have the same goal but use different means of delivering solutions.

In 2009, Secretary of Defense Gates explained the difference between Predator and Raptor. He stated that the trend in procurement of major systems was to acquire lower numbers as the systems become more capable.[42] However, these same systems are costing more, taking longer to field, and field numbers lower than predicted.Secretary Gates contrasted these traditional systems like Raptor to counterinsurgery operations. He asserted that counterinsurgery missions necessitate less than 100 percent solutions that

field in months not years.[43] This is consistent with a 2009 review of the DoD acquisition process. Lieutenant General (retired) Ronald Kadish reported to House Armeed Services Committee (HASC) panel that the JCIDS, PPBE, and DAS created two systems; one for war time equipment and one for peace time equipment.[44]

Nearly ten years after the project first began, Predator transitioned into the 658th AESS and started introducing more standardized PPBE, JCIDS, and DAS processes. The complexity of the standard system that consists of phases, milestones, and numerous documents and studies was vastly different from the Predator experience. There are vast differences between standard and rapid acquisition processes. The experiences of Predator and Raptor in the areas of oversight, development, and timelines represent several examples where differences exist between standard and rapid acquisition processes. While in the 658th AESS, Predator continued to close the gap in differences between standard and rapid acquisition. The question remains whether it is possible to take an acquisition program that began like Predator and successfully transition it into the standard system that other ACAT ID programs like Raptor had used from the beginning.

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CHAPTER 4

INCORPORATING STANDARDS

Introduction

The previous section compared the standard acquisition process applied to the Raptor program to Predator's experience. The 658th AESS[††] (referred to as the program office) was able to apply more standardized processes to Predator from 2006 to 2010 while achieving the highest operational tempo. When the 658th AESS activated in July 2006, the organization had conflicting guidance on how to proceed. Congress directed them to "use streamlined management tools to rapidly prototype, modify and field Predators with increased combat capability, while at the same time, ensure core program activities. . . are normalized to meet the demands of large-fleet operations."[1] The organization's rally cry through 2010 was "normalize but don't slow down." Essentially, the guidance directed the fledgling organization to continue using the rapid acquisition techniques similar to Big Safari but to also use standardize techniques like the Raptor. Implementing both aspects resulted in a dichotomy for the program.

Predator was in uncharted territory having to deliver combat capability and simultaneously transition to a new management style. Although the program office was successful in meeting increased operational needs for the warfighter, it came at the cost of incomplete standardization. On March 3, 2011, the Air Force accepted the last production Predator. However, the conversion to standard processes remained incomplete

[††]Between 2006–2010 the 658th AESS was renamed the 703rd AESG and the Medium Altitude Division. To avoid confusion, the term program office will be used to describe the organization after 2006.

and support of fielded Predator aircraft continues. Given contingency operations in Iraq and Afghanistan, accomplishing the goal of providing a reliable Predator asset to the warfighter took precedence over standardizing its acquisition process. The following chapter will highlight Predator's successes and challenges converting to standard acquisition processes through the end of the production program.

Team Composition

When Predator entered the AF in 1998, the Predator management team established a unique configuration operating in two locations. Most programs house the government team at an acquisition center that is in close proximity to other similar programs. Predator's construct possessed this element and additionally allowed a portion of the government team to be located with the primary contractor. The majority of the program office team was located within the Reconnaissance System Wing (now called Aeronautical Systems Center (ASC)) at Wright-Patterson AFB, Ohio. However, there was also a contingent co-located at GA-ASI, the prime air vehicle contractor's facility in San Diego, California. The lead individuals for the program office functions of management, contracting, finance, and logistics were located at the primary location in Ohio. Additionally, the preponderance of sustainment personnel worked at the California office.

This arrangement continued to remain in place when the program expanded and transitioned in July 2006. This structure of having the management team operating from two locations required the government and contractor teams to increase communication about objectives and expectations. This arrangement also fostered a strong team environment within the California government team and between the California

government and GA-ASI personnel. These networks endured through 2010 and helped the program office bridge the gap in GA-ASI's understanding of standard processes.

Another unique characteristic of the program was that from 1998 through 2006, the Big Safari director handpicked the staff. This increased the quality and experience level of the people supporting the program. The majority of the individuals located in California transitioned to the program office in 2006, which helped provide continuity during and after the organizational change. The program's success in rapidly delivering equipment relied on quality people and a small, close-connected communication network.

Between 2006 and 2010, the program transitioned away from selecting the majority of its people. This resulted in less experienced personnel joining the team. The government and civilian personnel systems increased their role in choosing who worked in the office. The graph in figure 5 depicts all personnel in the program office by year. Between 2006 and 2009, there was a DoD-wide increase in acquisition personnel across all disciplines. Predator benefited from this increase. However, some of the individuals hired by the program office had no prior experience with the Air Force, or government acquisition. A group of recently commissioned lieutenants also joined the unit. Between 2006 and 2010, there was a 62 percent increase in the total number of personnel supporting both Predator and Reaper programs. The addition of inexperienced personnel created more challenges for the program office. In key acquisition areas such as program management, finance, contracting, and logistics, several new personnel needed significant training in order to become effective.

When the program transitioned to the 658th AESS there were approximately 125 people including officers, enlisted airmen, government civilians, and contractor personnel

working in the program office's two locations.[2] In addition to not residing at the same location, they were also supporting Reaper, another major acquisition effort that became its own ACAT ID. Because of limited skill sets, several people had to support both programs. The rate of increasing employees did not keep pace with the increase of funding and additional requirements.

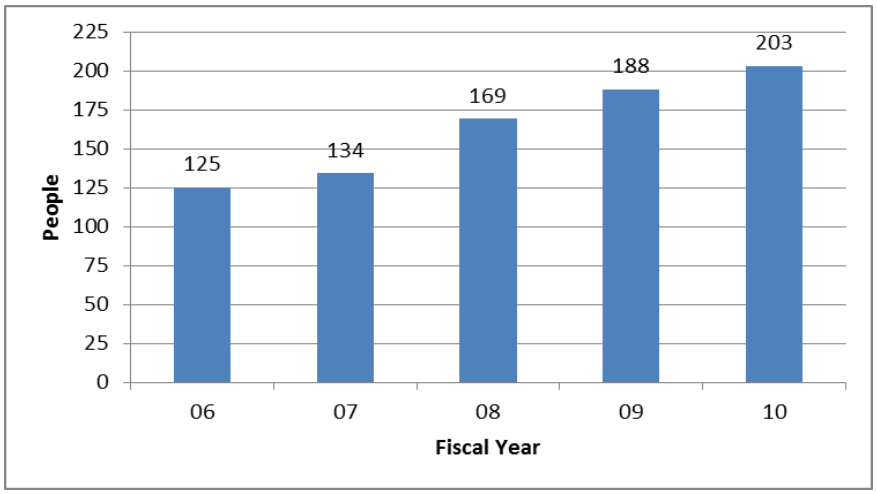

Figure 5. Predator Program Office Manpower

Source: Created by author from data from the Predator Program Office at Wright-Patterson Air Force Base, Ohio.

In particular, the lack of manpower and experienced personnel had a significant impact in transitioning the logistics function to standard practices. The prior decision to use contractor provided logistics created an environment where little government expertise and manpower was required. Activating a government depot, however, caused greater demand for not only manpower but also for experienced personnel. Further complicating this situation was the difficulty in finding personnel with depot activation

experience. With the 1994 acquisition reforms, there was an increase in using contractor logistics services over government provided services. As a result of the trend for contractor provided logistics, government expertise was difficult to find. Ultimately, logistics was an area that did not complete the conversion to standard processes.

Funding Management

The steady increase of funds aided the program office's ability to meet the growing demand. As operations in OEF and OIF intensified, Congress continued to appropriate more than ample production funding for the program office to continue fielding combat capability. In the four years from 2006 to 2009, the program received over $1B dollars of funding[‡‡] for Predator UAS, including air vehicles, sensors, GCS, and communication equipment. See table 4. The program routinely received global war on terrorism (GWOT) and overseas contingency operation (OCO) funding during this time. For example, in 2006, the program office executed their baseline plan to purchase seven air vehicles. Additionally, they bought another twenty-five air vehicles with GWOT funding. In 2007, the program office purchased all of the air vehicles with supplemental funding.

[‡‡]FY2006 numbers include some Reaper requirements.

Table 4. Predator Funding FY2006–FY2010 ($M)

	FY06	FY07	FY08	FY09	FY10
RDT&E Request	61.0	61.5	22.3	24.8	18.1
RDT&E Appropriated	63.5	68.2	34	37.2	23.8
Production Request	155.9	287.4	352.7	527.2	123.9
Production Appropriated	155.9	96.2	352.7	527.2	133.9

Source: Data from SAF/AQ[§§], Pentagon.

The amount and timing of these funds was difficult to predict. As a result, the program office often awarded undefinitized contract actions to GA-ASI and Raytheon. An undefinitized contract action gives authorization for contractors to build equipment without a firm financial agreement with the government. Another result of the large influx of receiving late funding was the awarding of contracts late in the fiscal year. Both of these techniques are undesirable in the standard acquisition process. Additionally, awarding contracts in the fourth quarter of the fiscal year is counter to the fiscal metrics used in the PPBE process. Until 2009, OSD rarely punished Predator for poor financial performance. In 2009, the system corrected Predator's 2007 budget by withdrawing over $100M to bring the program in line with the fiscal metrics. By the second quarter of FY2011, Predator was meeting OSD standards.

The number of monthly flight hours and annual combat air patrols[***] (CAP) changed year to year. This requirement instability affected the program's ability to use the PPBE process to request sustainment funds. Furthermore, without definitive

[§§]Production funding includes new production and retrofit production.

[***]CAP is four air vehicles, sensors, communication system.

requirements, the AF was unwilling to invest large amounts of money to transition Predator's maintenance from contractor-led to government-led. The focus of funding from 2006 through 2010 concentrated on production versus investing in an unknown depot.

Production Capacity

The influx of GWOT and OCO funding contributed to Predator's success due to fact that the industrial capacity was able to flex to meet production needs. The primary contractors were able to adjust their manufacturing processes as required by the changing demand. During this timeframe, GA-ASI routinely predicted that the government would buy more production units. Therefore, they built air vehicles in advance of AF contracts. GA-ASI's assumption proved correct as the program office purchased approximately 114 air vehicles between 2006 and 2010, which amounted to approximately 43 percent of the total air vehicle fleet. This technique enabled them to meet the AF requirements once contracts were in place. Other government and industry suppliers also continued to flex manufacturing processes to meet the changing demand. The lack of consistent requirements continually took resources away from focusing on transitioning in order to concentrate on ensuring the contractors met the production commitments.

Standardizing Improvements

From 2006 through 2010, the program was able to make significant strides towards standardization. The biggest success was the creation of internal acquisition management processes. The program office gained control of the internal requirements management process. They wrote the Acquisition Management Plan (AMP) that defined

how they would document, prioritize, and execute new requirements. As the organization grew, it became increasingly difficult to keep both the government and contractor team up-to-date on the emerging changes. This process established procedures, timelines, and expectations. One limitation of the acquisition management plan was the lack of a configuration management section. This would have created a systematic process to ensure the main players had knowledge of technical changes and their potential impact before they were incorporated into the contract. Configuration management was also important because of the lack of complete contractor-led configuration control. Until 2009, the program office lacked experienced configuration management personnel to establish a process. Once in place, it was also difficult to introduce new processes as part of Predator's last production contract.

The program office still made progress in transitioning to ACAT ID oversight requirements. In 2009, Predator crossed the ACAT ID financial threshold and the oversight structure drastically changed. Instead of a general officer located locally at Wright-Patterson, AFB, Ohio serving as the program's MDA, the responsibility was elevated to the OSD in the Pentagon. This added increased oversight and reporting requirements for the program office. The organization started including additional meetings with OSD staff to their office rhythm. They also started working on additional ACAT ID documentation that a standard program would have already completed before Milestone III approval. By 2006, the Predator program had completed six of the forty-seven ACAT II documents. Fortunately, the same documents are required for ACAT ID programs. During 2006 to 2010, the program office completed another five documents and was in process of completing another four documents. See table 5. The total ACAT

ID documentation completed was fifteen out of fifty-six requirements. A standard ACAT ID program would have completed all of the items Predator did before program initiation at MS II.

Table 5. Predator ACAT Requirements

Completed prior to 2006	Completed 2006-2010	In work during 2010
Operational Requirements Document	Military Evaluation Equipment	Information Support Plan
Capability Development Document	Expectation Management Agreement	Logistical Cycle Master Plan
Test and Evaluation Master Plan	Program Protection Plan	Programmatic Environmental, Safety and Health Evaluation
Single Acquisition Management Plan	System Threat Assessment	System Engineering Plan
Acquisition Program Baseline	Acquisition Program Baseline	
Unique Identification Plan		

Source: Created by author with data provided by the Predator Program Office, Wright Patterson Air Force Base, Ohio.

The program office chose not to attempt to complete the entire list of ACAT ID requirements. By 2009 when the last Predator air vehicle went on contract, the usefulness for several of the documents ended. The program office concentrated their efforts in areas that could provide utility for the program into the future. The focus was in three primary areas: protection, requirements management, and sustainment. For example, in the protection area, understanding the system's vulnerabilities became critical after a

computer virus infected the air vehicle's network.[3] Creating a requirements management system was the second focus. This was important because the program office started receiving requirements from numerous organizations. The various users were contacted the program office directly. Initially the program office led the user's forum to manage the requirements. Once Air Combat Command structured their organization to take over gathering requirements and leading the prioritization, the program office could concentrate on other items. The last focus area, sustainment required the most time and effort. The program office dedicated significant effort to ensuring that the fleet could maintain its high mission capable rate. There were limited spares available and many resources were required to manage what parts were available and where they needed to be. There was significant pressure on the program office to keep the air vehicles flying. Therefore, when an air vehicle or sensor was grounded, additional manpower was necessary because grounded aircraft status was reported to AF and OSD offices.

External Influences

Prior to 2006, the AF created plans to transition the yearly procurement of replacement air vehicles from the MQ-1B to the MQ-1C variant. The Army was pursuing a separate similar MQ-1C development effort called the Sky Warrior. Once OSD became aware of the similarities between the services' programs, they questioned the necessity of pursuing both. For several months preceding the decision about the fate of both programs, the program office redirected personnel resources to support inquiries and meetings. These efforts culminated in June 2007 when Acting Secretary of Defense Gordon England issued a memorandum recognizing the Army's separate MQ-1 requirement. Furthermore, he directed that the Army and the AF create a joint integrated

product team so that there was one single acquisition program.[4] The significance of his decision was that both services' air vehicles were to use a single joint contract for procurement. This change was a major deviation from the AF's acquisition strategy and OSD expected the changes to be implemented immediately without causing delays to Predator fielding.

The program office had to modify their existing production request to GA-ASI to include the additional requirements. This increased the challenges in the Predator contracting process. Additionally, the Army and AF had to coordinate proposed delivery schedules. The complexity of combining two separate acquisition efforts was significant. The logistics of getting the two teams together was one of many challenges. The Army program was located at Redstone Arsenal in Alabama; whereas, the AF team was in Ohio. Aligning funding, production, delivery priority, and strategy across two services was a significant endeavor. The program office consumed much time and effort working the details at all levels until the AF redirected their energy to concentrate on fielding Reapers and not buying any more Predators.

While all this realignment was occurring, Secretary Gates created the ISR Task Force in April 2008. Secretary Gates established this additional oversight organization to help deliver more ISR assets into Iraq. He believed that the military was not moving as fast as they could to field more UAS capability overseas.[5] The task force was comprised of members from the Joint Staff, military services, and the undersecretary of defense for intelligence.[6] This organization added to the meetings and oversight that the new program office was adapting to meet.

Sustainment

The problems associated with not understanding the sustainment aspects of the system manifested before Congress directed program responsibility to the AF. In the same intelligence authorization act that transitioned Predator to the AF, Congress wrote, "that as result of this vehicle's success, the amount of spare parts and attrition vehicles available appears to be insufficient."[7] Congress recommended a $25M increase to the program's budget for spares.[8] Predator's success did contribute to the need for more spare parts. However, a one-time increase in funding could not solve the greater issue of not completing failure rates or documents detailing what spares are required.[9] When the AF took responsibility, the government did not know the reliability of the system, did not have a list of spare parts and quantities, and did not have technical orders for operation and maintenance.[10] The program remained behind because as the flight hours increased there was no analysis to use to predict the spare parts requirement. This was a direct result of the program not following the standard process.

Increased Predator operations continued to create strains on the sustainment process. After the initial deployment in September 2001, Predator operated from four separate locations in five months. This increase in operational tempo created stress on the sustainment systems and operations nearly came to a halt in 2002. The team had bought and delivered more air vehicles than spare parts. Studies normally completed during Milestone I through Milestone III to understand the sustainment concept were not completed. Furthermore, since the original plan for the Predator program was for a small fleet size, there was little time or money invested in developing a long-term sustainment

plan.[11] The lack of funding for addressing standardizing sustainment was a major hindrance to the program.

Because of these issues, the Air Staff and Air Combat Command directed the program to make sustainment more normal. Gen Jumper explained his definition of "normalizing" was for the program to use "proven maintenance practices, supply chain management, technical data and performance metrics."[12] GA-ASI started using standard AF documentation procedures. The program also implemented AF standard parts tracking systems, which gave the program better controls of spares and repairs. However, the program office continued to buy and deliver planes at a faster rate than spares, which continued to exacerbate the sustainment process.

Collectively during the years 2002, 2003, and 2005, Congress gave the program office approximately $45M for spares outside of the standard PPBE process.[13] Some of the parts required eighteen months to produce therefore other techniques such as using expedited airlift were necessary to deliver them. Big Safari implemented techniques such as extending the time between maintenance checks and using expedited airlift to keep the planes operating. These non-standard methods continued to strain the logistics capability and PPBE process. As the flight hours per month increased, the need for additional spares also increased. The program office was constantly in reaction mode because the budget and production quantity changes each year as war time requirements grew. In 2003, the projection was for 350 hours per month. By 2005, this number grew to 720 hours per month. By 2009, the flight hours were about 5,000 per month.

Another technique the program office used was minimizing changes to the air vehicle. Instead, they routinely made changes to the GCS. This technique kept changes

low to the air vehicle production, which kept delivery commitments. This also allowed the program to incorporate improvements through production and retrofitting existing GCS. At the end of the ACTD, there were three different configurations of the air vehicle and three different configurations of the ground control station. By 2009, the configuration for the air vehicle stabilized, but there were over twenty different configurations for the GCS.[14] The major issue with this concept was that each GCS configuration required its own technical orders for operation and maintenance that created additional work and slowed the sustainment transition.

In April 2007, the AF assigned Warner Robins Air Logistics Center as the Predator Sustainment Support Manager. This was a key step in transitioning to government led sustainment. However, limited appropriated funding impeded their ability to create organic capability. Additionally, it took several months to establish relationships with the existing companies. There were also delays gaining AF approval to continue utilizing the same sole source relationships. By 2010, the program office had not completed the business case analysis to determine the best method to transition.

Summary

While operationally successful, the Predator program did not fully convert to standard processes by the delivery of the last Predator in 2011. The increased operations and operational requirements hindered the program's ability to continue converting to standard processes. Furthermore, the lack of requirement stability, proper manning, and limited funding directed for transitioning contributed to the slow incorporation of standard processes. Lastly, the biggest challenge for the program office was standardizing sustainment ten years after initial fielding. Each of the issues independently created

challenges and intertwined with each other to create cascading challenges. The timeframe from 2006 to 2010 had the largest demand in new requirements. Senior leaders wanted equipment fielded as fast as possible. At the same time, there were bureaucratic pressures to enforce standard practices. The program office could not meet both needs. The program did increase the amount of standard processes; but the preponderance of the focus was to field rapidly. By doing this, more configurations were fielded which in turn made it more difficult to standardize.

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CHAPTER 5

DISCUSSION

Introduction

The previous chapters covered Predator's origin and discussed the program's transition from rapid acquisition to standard acquisition processes. Predator has a unique background beginning as an ACTD, transitioning into a rapid acquisition unit, and becoming its own program office. There were several successes and challenges through the transitions to increasing standard processes. In the five years between 2006 and 2010, the Predator program accomplished incorporating several standard processes. However, by the end of the production program the result was not similar to a standard program. There were many remnants of Predator's ACTD origin. Additionally, the majority of problems with Predator's experience from 2006 through 2010 resulted from attempting to develop program documentation while trying to support production of a fielded weapon system. Doing this while simultaneously standardizing and establishing a new maintenance concept proved challenging. Additionally, trying to complete aspects of each defense acquisition phase at the same time ultimately resulted in a less than standard product. What follows are some overarching observations about Predator's transition and some thoughts on considerations for future programs.

Past difficult to overcome

During the ACTD process, Predator demonstrated military utility, but operational testing determined the system deficient in several areas such as reliability and documentation.[1] However, DoD decided to proceed directly from the pre-acquisition

ACTD activity into Milestone III full-rate production knowing these limitations. During the Operational Test and Evaluation (OT&E), the testing results determined Predator unsuitable, which is a measure of a program's availability, compatibility, transportability, interoperability, reliability, maintainability, manpower supportability, logistics supportability, documentation and training requirements.[2] These initial deficiencies continued to remain a problem through the production program.

For the eight years from 1998 to 2006 while Predator was in Big Safari, the culture focused on rapidly delivering combat power with an eighty percent solution. This "get it done" culture was also difficult to change. When the program left Big Safari in 2006, the majority of people located in San Diego began to support both the new program office and continued to support Big Safari, which retained an aspect of Predator special projects. The separate location created an additional challenge for converting these people to the concept of standardizing and delivering 100 percent solutions. Additionally, the group was small, close-knit and aligned with Big Safari and the Big Safari culture. They were accustomed to the rapid acquisition style because they had been performing under this system for eight years. Trying to get this group adopt new processes that were more bureaucratic was a challenge in management leadership.

Contract Strategy

Non-competitive contracts were a remnant of the ACTD and proved advantageous to the Predator program. In 1994, the government awarded GA-ASI a cost-plus fixed fee contract for air vehicles.[3] Soon after, the government awarded separate contracts for the sensor, communication system, and other support items.[4] Maintaining these relationships saved time by streamlining an aspect of the contracting selection process. For example,

the program successfully expedited the contractual timeline by continually justifying sole source contracts based on national security rationale. In addition, GA-ASI was the only company that could provide the required capability. Contract strategy was a key enabler for operational success, but also became a limitation for standardizing.

Standard programs with several different contractors providing equipment needing to operate together would normally have selected one contractor to serve as the program integrator. The integrator's responsibility is assembling the various components and ensuring that the complete system operates together. The government wrote in the original ACTD contracts that the program office assumed all the risk for integrating the final system.[5] This set the tone for the future of the program. Starting in 1998 no contractor was assigned prime integrator. The contractors and the government team shared the integration responsibility. One example of this shared responsibility is the sensor unit. The government had a contract with Raytheon to deliver sensors. Once Raytheon completed this task, the government would accept components the government would then deliver them to GA-ASI as government furnished property. This is not the ideal manner to build a system. Issues could arise across the interface between the two systems and the government, not Raytheon is responsible for the sensors. However, the government and contractor team was successful in managing this relationship.

Standard programs that complete Milestone III use predominately fixed price contracts, because at this stage, those programs are producing designs approved through the defense acquisition process. Between 2006 through 2010, the program office increased its use of fixed price versus cost-plus contract arrangements. The original construct relied on cost-plus contracts, which enabled rapid integration of new

technologies. The transition to fixed-price contracts remained limited in some areas because the technical baseline for the GCS and the sensor did not stabilize during this time. In contrast, the program office continued to utilize fixed-priced contracts to procure the basic air vehicle since the design has remained mostly unchanged since 1998.

Operational Success

Predator's operational success was a major hindrance to standardizing. The operational requirements started drastically increasing after 2006. Prior to 2006, the maximum Predator combat air patrols were eight. Between 2006 and 2007, CAPs increased sixty-four percent. During the following year, the CAPs increased by another eighty-three percent. These increases continued through 2010. From 2006 when the 658th AESS took control of Predator through 2010, the CAP count grew to forty-seven, which is approximately a 500 percent increase in combat power. Acquiring, fielding, and maintaining this growth in capability became a primary task over efforts to introduce more standards.

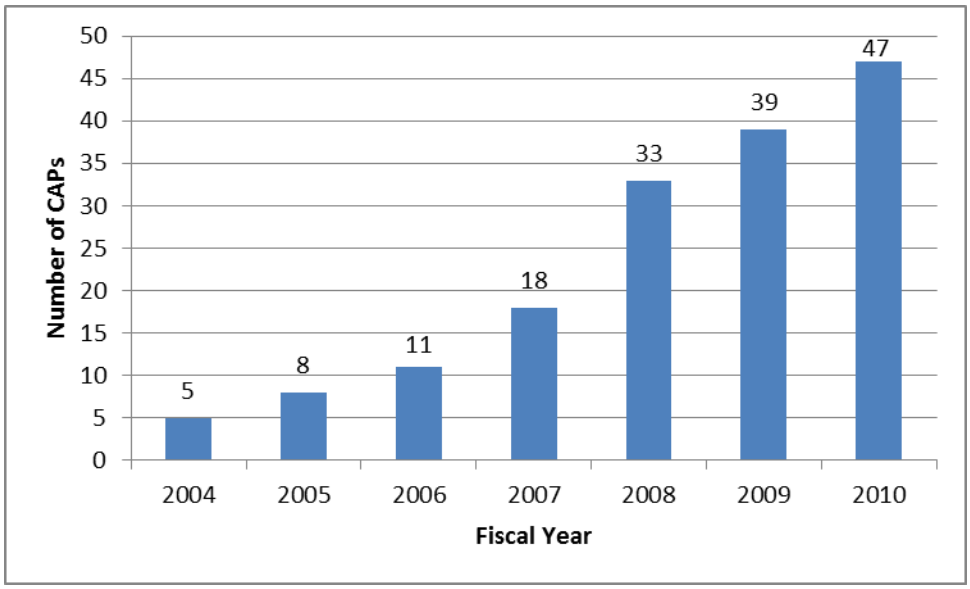

Figure 6. Combat Air Patrols

Source: Created by author with data provide by the Program Office, Wright Patterson Air Force Base, Ohio.

Program Office Structure

In 1998 when Predator transitioned to Big Safari, it entered into a well-established organization in existence since the 1950's. Predator's transition to the 658th AESS required the activation of a new organizational structure. The program office had to define leadership positions, qualifications, and staff the positions. They also created their own internal processes for meetings, documents, and metric tracking. In the midst of developing this new organization, they had to continue meeting production delivery dates. There was no operational pause to firmly establish and stabilize the new organization. At the time of transition, there was a well-defined production plan, but there was no strategic guidance or historical example of how to increase standards while maintaining the same operational pace. Additionally, there were no timelines, goals, or

priorities planned to monitor the transition. The program office was responsible for navigating through this quagmire.

Contractor Buy-In

In 2006 when Predator transitioned to the 658th and started to increase the use of standard processes, there was no strategic discussion with the prime contractor about the required changes and timeline to incorporate. Of the three primary contractors, GA-ASI had the least experience working with the government acquisition processes. When the ACTD began in 1996 GA-ASI was a small defense company. GA-ASI was not accustomed to using standard processes that other large defense contractors utilized. The company had to grow into one that would meet the ACAT ID standard. While there were people within the program office that understood the difference between Predator's acquisition processes and standard acquisition processes, fewer people at GA-ASI understood this difference due to their lack of ACAT II or ID experience. As a result, they applied little effort to incorporating standard government processes in the Predator program.

In 2006,GA-ASI actions and processes suggested that they expected new 658th AESS organization to operate similar to Big Safari. From GA-ASI's perspective, this could have been a reasonable expectation. The people that GA-ASI directly corresponded with at the California program office did not significantly change with the new organization. Furthermore, for the most part, the employees who were in California supported both the new program office and continued to support Big Safari's Predator special projects. Thus, they essentially dealt with the same people in the same manner.

As GA-ASI expanded business to include other DoD organizations, non DoD organizations, international sales, and multiple variants of Predator, they focused on maintaining production rather than incorporating standard acquisition processes. GA-ASI also had the security of a sole source contractual relationship with the program office. There was also a sense of security knowing that they could only fill the government's insatiable need for Predators. There was little financial interest for them to invest money and resources into incorporating standard processes.

The program office had little leverage to persuade GA-ASI to become compliant. For example, GA-ASI had no incentive to cooperate with the AF's desire to transition to an organic depot. From their perspective, this transition would mean less business and profit for them. GA-ASI owned all of the technical data rights that the government needed in order to activate a new depot because the government did not procure any at the start. Therefore, in order for the program office to transition the depot, the government needed to contract with GA-ASI to ascertain data that would normally have been determined before Milestone III. Once the AF determined that they were stopping Predator production and shifting focus to maintaining the existing fleet, it was not in GA-ASI's financial interest to sell the depot maintenance aspect of their business to the government. GA-ASI's slow transition to incorporating defense acquisition standards into their processes ultimately reduced the program office's ability to do the same.

Conclusion

By 2010, the end of this study period, the Predator production program ended and the conversion to standard acquisition processes was incomplete. Many operational and programmatic achievements were accomplished along the journey, but true

standardization was not. However, this does not imply that the conversion could not have been completed or that other programs cannot accomplish the transition. Predator remains a trailblazer in many areas and other programs can learn from Predator's experience if such an endeavor is pursued in the future.

Implications for future

There is likely not to be another program with the same past as Predator. It began as an ACTD, became a rapid acquisition program, and finished as a standard acquisition program. It used two non standard processes before transitioning to the standard. In 2009, a Defense Science Board Task Force reported that the services were using over 20 different ways to accelerate programs.[6] Several of these rapid acquisition programs will transition into the standard process as the US continues to drawdown operations in Iraq and Afghanistan. These programs should take away five key lessons from Predator's experience trying to incorporate standard processes after years of operational use.

1. Programs need to have an established transition timeline.

2. Programs need to have requirement stability during transition.

3. Transitioning into a new organization versus an existing organization requires additional time and mix of skills.

4. The lack of procuring initial sustainment data is difficult to overcome.

5. Contractor commitment to the process makes the process easier.

The first item could have been easier for Predator if the AF had established a transition team in 2006. The transition team could have served a similar role as Task Force Arnold did during Big Safari management where they prioritized and validated requirements. The transition team could also have included members from the DAB. This

would have helped establish timelines and commitment on which ACAT documents the program should complete.

In 1996, Secretary Kaminiski issued a memorandum for acquisition programs with recommendations for transitioning ACTDs into the standard process[†††]. OSD needs to issue similar overarching guidance for programs transitioning from the various rapid processes into the standard. This will also enable OSD and the various stakeholders for each program to coordinate on the direction of each effort. OSD's guidance should be similar to Secretay Kaminski's where he provided guidelines and not formal direction. Each rapid program needs individually assessed to determine the best path forward. There is no universal solution applicable to the various programs.

The second item, requirement stability is critical for a successful transition. If the program office is going to write some of the formal ACAT documentation, it is important for them to operate from a stable baseline. Most of the documents take months and often require generating data to complete. There are also lengthy review processes to formalize the final document. Programs cannot complete this process if the baseline is constantly changing. It is recommended that programs not attempt to transition until the program requirements are stable.

For the third item, programs cannot successfully transition without the proper mix of manpower. Most rapid acquisition programs can operate with minimal personnel compared to standard programs. If the program is going to transition into an existing program office structure then less additional manpower is required. However, if the rapid

[†††]Found at https://acquisition.navy.mil/content/download/718/3038/file/kamin4.pdf (accessed November 16, 2011).

program has to become its own new program office, then significant additional manpower is required. Additionally, senior acquisition personnel need selected versus junior personnel. Each program needs to examine the quantity of people needed to complete the level of ACAT reporting that will be required. Furthermore, the program needs to understand the complexity of the transition to determine the right experience level for the personnel.

For the fourth item, OSD and the AF need to investigate on whether a program can overcome the way its sustainment began before directing a change. Cost benefit analysis and strategies need determined before decisions are made. It may be the case that if the government accepts limitations at the start, then they may not be reversible later. This can be further complicated when programs are accelerated without a standard sustainment plan. In Predator's case, if OSD and the AF understood the massive hurdle that the program needed to overcome in order to transition into the standard, they could have selected to leave it as is. More than ten years after Predator tranisitoned from the ACTD, this process is still incomplete. The time and money invested into this conversion may not be worth the result. Furthermore, consideration for staying with the existing procedures should be evaluated when the processes have been successful.

The fifth item is similar in many ways to the fourth. OSD and AF need to have a strategic decision about transitioning programs based on the established contractual relationships. OSD and AF directing a program to transition to standards may not be sufficient to accomplish the task. An understanding of a program's ability to change the contractual relationships years after they are established may not be possible. This is another area where OSD needs to consider the manner each rapid acquisition program

transition. What works for one program, may not work for another. Each program needs analyzed with respect to its uniqueness and its future use to determine what mechanisms are best to encourage contractors to transition. It is possible that the effort will not be worth the time and cost. Moreover, if the intent of the rules can be met there is no need to discard the existing system.

Each of these five considerations are also important for OSD and the AF to consider before pursuing another rapid acquisition program. If Predator had bought some source data in the beginning or along the way, the conversion to standard sustainment processes would have been easier. It is also important to remember that it is quick to streamline the acquisition process in the beginning, but the implications are long lasting. See figure 7. If Predators continue to operate for another 10 years, their operational lifecycle would be greater than 20 years. The decisions made at the start to save time by skipping steps become quite expensive later. Future rapid acquisition programs should procure some set of minimal sustainment data to reduce the long term operating and support cost.

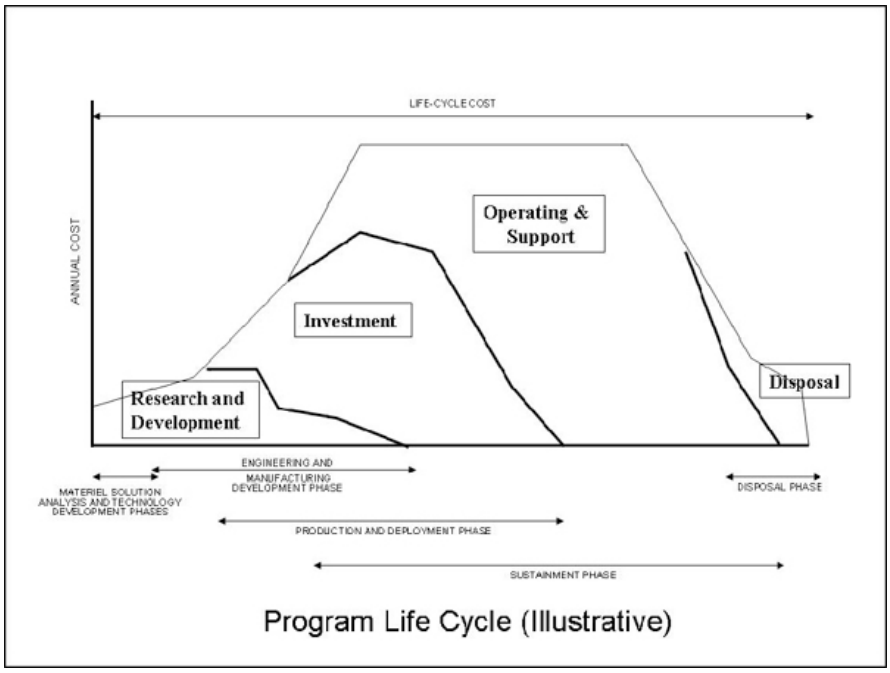

Figure 7. Program Life Cycle Cost

Source: Defense Acquisition Guidebook, https://acc.dau.mil/CommunityBrowser.aspx?id=314767 (accessed March 2, 2012).

The Predator experience also makes the case for revamping the defense acquisition system. Predator has successfully demonstrated operational and programmatic success as an ACAT II and ACAT ID program without utilizing the full extent of the formal defense acquisition system. Predator completed 15 out of the 56 ACAT ID regulatory and statuatory requirements. At a minimum, this opens the door to question the necessity of the remaining forty-one requirements. However, a complete review of all the requirements is warranted. After World War II Congress initiated the current DAS programs use today. This process has largely remained the same. Over the years, Congress incorporated the majority of the changes built on top of the existing system without a complete relook at the system. If Congress, OSD, and the services agree that

10-15 years is too long to use the standard DAS to field solutions for capability gaps, then now is an opportunity to relook at the entire procurement system.

This analysis has already begun. In 2009, Secretary Gates and others began calling for a new process for rapid acquisition programs. Secretary Gates stated that the existing procurement process has evolved into two different paradigms, one for conventional programs and another for stability and counterinsurgency programs.[7] When Congress passed the National Defense Authorization Act for Fiscal Year 2011, they formalized a standard method for implementing rapid development and rapid acquisition for all of the services. By doing this, they recognized that the standard system did not meet the needs of rapid acquisition programs. They consolidated the twenty different rapid acquisition methods into one. If Congress recognizes that two systems are necessary, then it is time to rethink if rapid acquisition programs should convert into the standard. It is possible that the rapid acquisition process should become the new standard. Now that the Act is in effect, new defense acquisition system rules need written for wartime procurements or the existing DAS needs re-examined for applicability to rapid programs.

In light of increased counterinsurgency operations and conventional threats, it is time for a fresh look at the future of acquisition. America is at a unique moment in history. The next threats could come from either conventional or irregular forces. New processes and standards need established to preserve the ability to perform both rapid and standard acquisition.

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[1]Government Accounting Office, "Advanced Concept Technology Demonstration Program Can Be Improved," 7.

[2]Marc Strass, "DOT&E Report Says Predator is not Operationally Effective," *CBS Business Library*, October 26, 2001, http://findarticles.com/p/articles/mi_6712/is_19_212/ai_n28868427/ (accessed October 7, 2011).

[3]Thirtle, Johnson, and Birkler, *The Predator ACTD*, 42.

[4]Ibid.

[5]Ibid.

[6]Defense Science Board Task Force on the Fullfillment of Urgent Operational Needs Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics (Washington, DC. July 2009), 9, http://www.ndia.org/Advocacy/Resources/Documents/LegislativeAlerts/DSB_Urgent_Needs_Report_7_15_2009.pdf (accessed March 1, 2012).

[7]Gates, "A Balanced Strategy," 4.

APPENDIX A

Highlights of Predator Operation

At the time of the transfer from Big Safari, the government had purchased 134 air vehicles. Ultimately, the government acquired 268 Predators. The last being accepted on March 3, 2011.

In May 2006, the Federal Aviation Administration authorized Predators to fly in United States airspace to aid in the search for Hurricane Katrina survivors.[1] In January 2010, six Predators flew from a Puerto Rican airport to perform surveillance missions over Haiti in support of the international aid effort following the earthquake. Predator is the first unmanned system to fly humanitarian missions or to operate from an active civilian airport.[2]

From the start of the 658th's management, the Chief of Staff Air Force, Air Combat Command, and Secretary of Defense all continued pressing the need for fielding more combat capability overseas. In March 2006, General Ronald Keys, the ACC commander sent direction to the program office that his "number one priority is to flood the AOR with employable Predator systems."[3] As a result, Predators and Reapers conducted 10,949 missions in Iraq and Afghanistan between 2007 and 2008.[4]

In order to support operations in Fallujha, the CSAF directed the organization to "do whatever needs to be done. . . I don't want a single ground control station that can be flown to be sitting idle."[5] In March 2009, General Keys, directed the services to deliver 75 percent solutions in a month instead of developing "gold-plated" products.[6]

By the end of 2010, all AF Predator units combined accumulated over 878,000 flight hours with more than 90 percent in support of combat operations. Some individual

air vehicles surpassed 10,000 hours of operation. By the end of December 2010, the Air Combat Command, Air National Guard, and Air Force Special Operations Command were each conducting Predator missions that contributed to the operational tempo. One unit, the 163rd Reconnaissance Wing, located at March Air Force Reserve Base, surpassed 50,000 Predator flight hours in August 2010. They were the first Air National Guard unit to reach that milestone. The unit's previous mission was flying KC-135 Stratotankers at a rate of approximately 3,000 hours per year. Colonel Randall Ball, the wing Commander, stated that to achieve the same accomplishment of 50,000 flight hours with the Stratotanker would have taken more than 16 years. With the Predator, it took just three years.

In 2010, the Predator fleet logged over 191,000 flight hours with a 93 percent mission capable rate.[7] Predator had the highest mission capable rate. in the Air Force, exceeding 32 operational air vehicles.[8] Mission Capable Rate is the assessment of a system's ability to perform its assigned mission(s). Only MQ-1 and MQ-9 (Reaper) had mission capable rates greater than 90 percent. For Predator to accomplish that amount of flight hours in one year means that they were operational for approximately 15,916 flight hours per month and approximately 530 hours per day. No other asset in the AF inventory was flying that many hours.

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[1]Dr. Yvette Weber, "MQ-1 Predator & MQ-9 Reaper Overview for the National Defense Industrial Association" (Presentation, Wright-Pat Club, Dayton, Ohio, April 19, 2011).

[2]Michael Hoffman, "Predators send video feeds to help in Haiti," *AirForce Times,* January 29, 2010, http://www.airforcetimes.com/news/2010/01/airforce_haiti_ predator_012910/ (accessed January 17, 2012).

[3]Doug Henley,"MQ-9" (ACC/A8P-UAV SMO Briefing, March 30, 2006).

[4]Christopher Drew, "Drones are Weapons of Choice in Fighting Qaeda," *The New York Times*, March 17, 2009, http://www.nytimes.com/2009/03/17/business/17uav.html?pagewanted=all (accessed January 21, 2012).

[5]"All In" (SECDEF Tasker, Point Paper on Predator/Reaper, 658th AESS).

[6]Drew, "Drones are Weapons of Choice."

[7]Dr. Yvette Weber, "MQ-1 Predator & MQ-9 Reaper Overview."

[8]Bruce Rolfsen, "Osprey Availability Still Hovering at 50 Percent," *The AirForce Times*, November 29, 2010, http://www.airforcetimes.com/news/2010/11/air-force-osprey-availability-about-50-percent-112910w (accessed February 29, 2012).

APPENDIX B

ACAT Requirements

ACAT II Documents[‡‡‡]
Required by Statue

1	Acquisition Program Baseline (APB)
2	Alternative Live Fire T&E Plan
3	Analysis of Alternatives (AoA)
4	Benefit Analysis and Determination
5	Clinger-Cohen Assessment (CCA) Compliance
6	Competition Analysis
7	Consideration of Technology Issues
8	Cooperative Opportunities
9	Core Logistics/Source of Repair analysis
10	DoD CIO Confirmation of CCA Compliance
11	Initial Operational Test and Evaluation Completed
12	Live Fire T&E report
13	Live Fire T&E waiver
14	Low Rate Initial Production (LRIP) quantities
15	Market Research
16	Military Equipment Valuation (MEV)
17	Post Implementation Review
18	Programmatic Environmental, Safety and Health Evaluation (PESHE)
19	Technical Data Rights Strategy
20	Technology Development Strategy (TDS)

[‡‡‡]Found online at https://dap.dau.mil/aphome/das/pages/mdid.aspx (accessed February 17, 2012).

ACAT II Documents
Required by Regulation

21	Acquisition Decision Memorandum (ADM)
22	Acquisition Information Assurance Strategy
23	Acquisition Strategy
24	Affordability Assessment
25	AoA Study Guidance
26	Capability Development Document (CDD)
27	Capability Production Document (CPD)
28	Exit Criteria
29	Information Support Plan (ISP)
30	Initial Capabilities Document (ICD)
31	Item Unique Identification (IUID) Plan
32	Joint Interoperability Test Certification
33	Life-Cycle Signature Support Plan
34	Life-Cycle Sustainment Plan (LCSP)
35	MDA assessment of CBRN survivability
36	Net-Centric Data Strategy
37	Operational Test Agency Report of OT&E Results
38	Post-Critical Design Review (CDR) Report
39	Preliminary Design Review (PDR) Report
40	Program Protection Plan (PPP)
41	Spectrum Supportability Determination
42	System Threat Assessment
43	System Threat Assessment Report (STAR)
44	System Engineering Plan (SEP)
45	Technology Readiness Assessment (TRA)
46	Test and Evaluation Master Plan (TEMP)
47	Test and Evaluation Strategy (TES)

ACAT I Documents

Required by Statue

1	Acquisition Program Baseline (APB)
2	Alternative Live Fire T&E Plan
3	Analysis of Alternatives (AoA)
4*	Benefit Analysis and Determination
5	Beyond LRIP Report
6	Clinger-Cohen Assessment (CCA) Compliance
7	Competition Analysis
8	Consideration of Technology Issues
9	Cooperative Opportunities
10	Core Logistics/Source of Repair analysis
11	DoD CIO Confirmation of CCA Compliance
12*	Independent Cost Estimate (ICE)
13*	Industrial Base Capabilities
14	Live Fire T&E report
15	Live Fire T&E waiver
16	Low Rate Initial Production (LRIP) quantities
17*	Manpower Estimate
18	Market Research
19*	Milestone Decision Authority (MDA) Certification
20	Military Equipment Valuation (MEV)
21	Post Implementation Review
22	Programmatic Environmental, Safety and Health Evaluation (PESHE)
23*	Replaced System Sustainment Plan
24*	Selected Acquisition Report (SAR)
25	Technical Data Rights Strategy
26	Technology Development Strategy (TDS)

* Indicate changes between ACAT I and II requirements

ACAT I Documents
Required by Regulation

27	Acquisition Decision Memorandum (ADM)
28	Acquisition Information Assurance Strategy
29	Acquisition Strategy
30	Affordability Assessment
31	AoA Study Guidance
32	Capability Development Document (CDD)
33	Capability Production Document (CPD)
34*	Component Cost Position (CCP)
35*	Corrosion Prevention Control Plan
36*	Cost Analysis Requirements Description (CARD)
37*	DoD Component Cost Estimate (CCE)
38	Exit Criteria
39*	Independent Technology Readiness Assessment
40	Information Support Plan (ISP)
41	Initial Capabilities Document (ICD)
42	Item Unique Identification (IUID) Plan
43	Joint Interoperability Test Certification
44	Life-Cycle Signature Support Plan
45	Life-Cycle Sustainment Plan (LCSP)
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54	Technology Readiness Assessment (TRA)
55	Test and Evaluation Master Plan (TEMP)
56	Test and Evaluation Strategy (TES)

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